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DRAFT

ENVIRONMENTAL ASSESSMENT

WINTERIZATION ACTIVITIES IN PREPARATION FOR COLD STANDBY AT THE PORTSMOUTH GASEOUS DIFFUSION PLANT PIKETON, OHIO

May 2001

U.S. Department of Energy
Oak Ridge Operations Office
Oak Ridge, Tennessee

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ABBREVIATIONS AND ACRONYMS

AMSL	above mean sea level
bgs	below ground surface
BHP	boiler horsepower
BJC	Bechtel Jacobs Company LLC
BMP	best management practice
Btu	British thermal unit
CAA	Clean Air Act of 1970
CAS/CMS	Cleanup Alternatives Study/Corrective Measures Study
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
Ci	curie
CWA	Clean Water Act of 1972
CX	Categorical Exclusion
D&D	decontamination and decommissioning
DOE	U.S Department of Energy
EA	environmental assessment
EDE	effective dose equivalent
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
FY	fiscal year
gal	gallon
GCEP	Gas Centrifuge Enrichment Plant
GDP	gaseous diffusion plant
ha	hectare
HEU	highly enriched uranium
HF	hydrogen fluoride
IGWMP	Integrated Groundwater Monitoring Plan
km/h	kilometers per hour
L/d	liters per day
MGD	million gallons per day
mph	miles per hour
mrem	millirem
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NCS	nuclear criticality safety
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
NRCE	National Register Criteria for Evaluation
NRHP	National Register of Historic Places
ODNR	Ohio Department of Natural Resources
ODOD	Ohio Department of Development
OSHA	Occupational Safety and Health Act of 1970

OVEC	Ohio Valley Electric Corporation
PCB	polychlorinated biphenyl
pCi/L	picocuries per liter
PGDP	Paducah Gaseous Diffusion Plant
PORTS	Portsmouth Gaseous Diffusion Plant
PRG	preliminary remediation goal
PSD	prevention of significant deterioration
psi	pounds per square inch
RCRA	Resource Conservation and Recovery Act of 1976
RCW	recirculating cooling water
RHW	recirculating hot water
ROD	Record of Decision
ROI	region of influence
ROW	right-of-way
SAR	Safety Analysis Report
SHPO	State Historic Preservation Officer
SODI	Southern Ohio Diversification Initiative
SOMC	Southern Ohio Medical Center
STP	sewage treatment plant
TCE	trichloroethene
TSCA	Toxic Substances Control Act of 1976
USACE	U.S. Army Corps of Engineers
U.S. EPA	U.S. Environmental Protection Agency
UF_6	uranium hexafluoride
USEC	United States Enrichment Corporation
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
WWH	Warmwater Habitat

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EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE) proposes to conduct winterization activities in preparation for cold standby for facilities at DOE's Portsmouth Gaseous Diffusion Plant (PORTS) located at Piketon, Ohio. Winterization of PORTS is necessary because of DOE's decision to place the plant in cold standby and because facilities and systems must be protected from freezing following the United States Enrichment Corporation's decision to cease uranium enrichment at PORTS by June 2001.

DOE has prepared this Environmental Assessment (EA) to present the public with information on the proposed activities and to ensure that potential environmental impacts are considered in the decision-making process.

The proposed action is to conduct winterization activities at PORTS in preparation for cold standby; there are several alternatives for winterization options which are addressed in this EA. Proposed winterization activities include installation and operation of a hot water heating facility with associated recirculating water pumps and installation and operation of a series of electric heaters in PORTS process buildings. Initially, the hot water boilers would operate on #2 fuel oil, but would likely be converted to natural gas in the future. Since use of natural gas would require running an approximate 5-mile natural gas line to the site, the impact of the new gas line is also addressed. Alternatives to the proposed action which would be considered include the No-Action Alternative as required by the National Environmental Policy Act.

Environmental impacts also were evaluated for the No-Action Alternative. If no action were taken, freezing of facilities and systems during periods of cold weather would likely have the following results:

- substantial and costly damage from freezing of fire protection systems;
- potential Resource Conservation and Recovery Act of 1976 (RCRA) waste storage permit noncompliances due to waste freezing;
- the potential for generating contaminated water or other materials requiring cleanup, processing, storage and/or disposal (e.g., uncontrolled fire-protection water releases contacting contaminated equipment, waste storage containers, and polychlorinated biphenyl-oils associated with building ventilation systems); and
- potential impact on surrounding environment (soils, streams, groundwater, etc.).

Other impacts include lack of heating for facilities housing DOE and contractor staff, loss of progress on RCRA corrective action implementations because of workforce interruption related to unsafe working conditions (e.g., freezing temperatures), and possible concerns with facilities containing highly enriched uranium. Four alternatives were evaluated by DOE for further analysis: (1) supplying steam from the existing X-600 Coal Fired Steam Plant; (2) installing electric hot water boilers within individual facilities; (3) installation of a hot water heating facility with associated recirculating water pumps tied to an existing hot water distribution system, installation of a natural gas pipeline, and installation of approximately 900 electric space heaters in the three gaseous diffusion process buildings; and (4) the no-action alternative.

Under the proposed action, a new hot water boiler system supplied with #2 fuel oil with the potential for conversion to natural gas would be installed, and a hot water heating facility would be added to the northeast corner of Building X-3002. This alternative would provide a solution for heating site structures and would mitigate facility and equipment damage as well as environmental and safety concerns prior to the onset of the winter season. This solution is timely and would not interfere with safe environmentally sound operations of the site. This alternative would also allow currently installed fire protection systems to operate without alteration. This alternative ties into an existing hot water distribution system. This alternative ties into an existing hot water distribution system. This alternative would be the most viable option due to the lower capital and operating costs.

Potential air quality impacts are expected to be minimal. An air permit-to-install has been submitted to the Ohio Environmental Protection Agency for the operation of the boilers.

Through the application of best management practices and with the implementation of appropriate mitigation measures, potential adverse environmental impacts to soils, water resources, and ecological resources would be expected to be minimal. Tanks required for the storage of fuel for the facility would be located in areas that have been previously disturbed by industrial activity. Dikes would be installed at this location to mitigate any environmental damage that could result from spillage. In addition, fuel lines connecting the storage tank and boilers would be installed aboveground and regularly inspected to ensure that any leakage from these lines would be readily identified and contained. No threatened and/or endangered species are known to be present within any areas proposed for the natural gas line installation or the addition to the northeast corner of Building X-3002. Floodplains, streams, and wetland areas would be avoided to the extent practicable. In addition, a floodplain/wetland survey was conducted for the routing of the proposed gas line. A copy of this report is included in Appendix A of this EA.

The proposed action has been reviewed in accordance with Section 106 of the National Historic Preservation Act and 36 *Code of Federal Regulations* 800. On March 8, 2001, a letter of notification was transmitted to the Ohio State Historic Preservation Officer (SHPO) with a DOE determination that there would be no adverse effects on historical resources included or eligible for inclusion on the National Register of Historic Places. The X-3002 building was originally intended to be a gas centrifuge processing facility; however, no process equipment was installed and the facility has been used as a warehouse. On April 25, 2001, a letter of notification was transmitted to the Ohio SHPO concerning the proposed installation of a natural gas pipeline from Zahns Corner to the X-3002 building. The purpose of the natural gas pipeline is to supply fuel for the recirculating hot water plant to be installed at the X-3002 facility. Copies of these letters are included in Appendix B of this EA. No facility modifications would be initiated until 30 days after the Ohio SHPO notifications or Ohio SHPO response, whichever is earlier. In addition, a Phase I assessment of cultural and historic resources was conducted for the routing of the proposed gas line. A copy of this report has been provided to the Ohio SHPO and is included in Appendix C of this EA.

Socioeconomic impacts associated with modifications to Building X-3002 would have a minor impact on transportation; however, no other socioeconomic impacts, including Environmental Justice concerns, would result from this proposed action. Installation of the natural gas pipeline would result in temporary impacts involving property disturbance during pipeline installation and associated nuisance related to construction activities. In addition, the pipeline would be within 750 ft of Piketon Jr. High School. Protective and emergency services are expected to be adequate for the plant. Based on the absence of minority tracts relative to PORTS, disproportionate impacts to minority populations would not occur. Although many low-income populations are located in Pike County, no disproportionately high and adverse human health or environmental impacts to these populations are expected.

Adverse transportation and noise impacts would be minimal from this proposed action. No sensitive noise receptor sites (e.g., picnic areas, playgrounds, churches) are located within or near PORTS.

1. INTRODUCTION

1.1 PURPOSE AND NEED FOR U.S. DEPARTMENT OF ENERGY ACTION

The proposed action evaluated in this Environmental Assessment (EA) is to provide heating capability for winterization of facilities at the U.S. Department of Energy's (DOE) Portsmouth Gaseous Diffusion Plant (PORTS) located at Piketon, Ohio. Winterization of PORTS is necessary because of DOE's decision to place the plant in cold standby and facilities and systems must be protected from freezing following the USEC decision to cease uranium enrichment at PORTS by June 2001. Freezing of facilities and systems would likely result in substantial and costly damage from freezing of fire protection systems; potential Resource Conservation and Recovery Act of 1976 (RCRA) waste storage permit noncompliances due to lack of heat; and the potential for generating contaminated water or other materials requiring cleanup, processing, storage and/or disposal. Other impacts include lack of heating for facilities housing DOE and contractor staff, disruption of the RCRA Corrective Actions Program, and possible concerns with facilities containing highly enriched uranium (HEU). In addition, nuclear criticality safety (NCS) problems could result from the uncontrolled release of water from fire protection systems caused by freezing of sprinkler system lines in areas where uranium hexafluoride (UF_6) is present at various levels of enrichment.

1.2 BACKGROUND

PORTS is one of only two federally owned, privately operated uranium enrichment facilities in the United States. The uranium enrichment production and operations facilities at the site are owned by DOE and leased to the United States Enrichment Corporation (USEC). DOE's managing and integrating contractor, Bechtel Jacobs Company LLC (BJC), is responsible for environmental restoration, waste management, and operation of non-leased facilities (facilities not leased to USEC) (DOE 1999a). Martin Marietta Energy Systems, Inc., and its successor company Lockheed Martin Energy Systems, Inc., were the management contractors for DOE from November 1986 through March 1998. On April 1, 1998, BJC assumed responsibility as the environmental management contractor for DOE. BJC is responsible for environmental restoration, waste management, and operation of non-leased facilities (facilities that are not leased to USEC) at PORTS. PORTS is located in a rural area of Pike County in south central Ohio, on a 9.3-km^2 (5.8-$mile^2$) site (Figs. 1.1 and 1.2). The nearest residential center in this area is Piketon, which is about 8.1 km (5 miles) north of the plant on U.S. Route 23. The county's largest community, Waverly, is about 16.1 km (10 miles) north of the plant. Additional population centers within 80.5 km (50 miles) of the plant are Portsmouth, 43.5 km (27 miles) south; Chillicothe, 43.5 km (27 miles) north; and Jackson, 41.9 km (26 miles) east. In June 2000, USEC announced that enrichment operations would cease by June 2001. The three enrichment process buildings plus 32 other buildings are now heated by waste heat from operation of the enrichment process.

1.2.1 PORTS History

PORTS has been in operation since the mid 1950s as an active uranium enrichment facility supplying enriched uranium for government and commercial use. Initially, PORTS was needed to provide ^{235}U at assays above those of the other production facilities at Oak Ridge, Tennessee, and Paducah, Kentucky. In the late 1970s, PORTS was chosen as the site for a new enrichment facility using gas centrifuge technology. Construction of the Gas Centrifuge Enrichment Plant (GCEP) began in 1979 but was halted in 1985 because the demand for enriched uranium decreased.

Fig. 1.1. Location of PORTS in relation to the geographic region.

Fig. 1.2. PORTS environmental assessment area.

In 1991, DOE suspended production of HEU for the U.S. Navy at PORTS. The plant continues to produce only low-enriched uranium for use by commercial nuclear power plants (DOE 1999a; ORNL 1999).

In accordance with the Energy Policy Act of 1992, USEC, a newly created government corporation, assumed full responsibility for uranium enrichment operations at PORTS on July 1, 1993. DOE retains certain responsibilities for decontamination and decommissioning (D&D), waste management, depleted UF_6 cylinders, and environmental remediation. USEC subsequently became a publicly held private corporation on July 28, 1998 (DOE 1999a; ORNL 1999).

The PORTS process buildings were constructed from 1952 to 1954, as gaseous diffusion facilities for the isotopic enrichment of uranium. The process buildings contain approximately 8,213,608 gross square footage. Each of the three process facilities (X-326, X-330, and X-333) are approximately one-half mile in length and contain approximately 30 acres and two floors each. The buildings are heated primarily by heat of process (compression) and, in the case of extended process pipe runs, some auxiliary steam heat. This steam heat is designed and applied to maintain the process gas in the gaseous phase and has very little or no effect on building internal ambient temperature.

The PORTS cascade is comprised of over 4,000 stages consisting of a motor, a compressor, a converter, and the interconnecting piping and valves. As the process gas moves through the individual stages, it is compressed, producing a great amount of process heat. In the early 1980s, a recirculating hot water (RHW) waste heat recovery system was installed to supply heat to the added GCEP and to a few of the previously heated GDP buildings. As currently designed, the RHW system circulates gaseous diffusion plant (GDP) hot water to 32 buildings for heating. In June 2000, USEC announced it will shut down the PORTS GDP cascade after June 2001. Consequently, the waste heat for support buildings heating will no longer be available.

1.2.2 Uranium Enrichment Activities at PORTS

The uranium enrichment production and operations facilities at PORTS are leased to USEC and take place on approximately 259 hectares (ha) (640 acres) within the 1503-ha (3714-acre) DOE reservation. In addition to the three gaseous diffusion process buildings, extensive support facilities are required to maintain the diffusion process. The support facilities include administration buildings, a steam plant, electrical switchyards, cooling towers, cleaning and decontamination facilities, water and wastewater treatment plants, fire and security headquarters, maintenance, warehouse, and laboratory facilities.

As mentioned previously, on June 21, 2000, USEC announced that it would cease uranium enrichment operations at PORTS starting in June 2001 (USEC 2000). Since USEC's announcement, DOE has proposed placing the GDP in cold standby (see Sect. 4.13.1) for a definition of cold standby). USEC intends to operate its transfer and shipping facilities at PORTS for approximately 5 years after the current enrichment operations cease.

1.2.3 Environmental Restoration at PORTS

The DOE-PORTS Environmental Restoration Program was developed in 1989. Site cleanup is managed in accordance with RCRA of 1976, amended in 1984 by the Hazardous and Solid Waste Amendments. Other applicable laws include the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, amended in 1986; Toxic Substances Control Act of 1976 (TSCA); Clean Water Act of 1972 (CWA); and Clean Air Act of 1970 (CAA). Oversight of cleanup activities at PORTS is conducted by the Ohio Environmental Protection Agency (EPA) and U.S. EPA under the directive of a Consent Decree between the State of Ohio and DOE, issued on August 29, 1989, and an Administrative Consent Order between DOE, Ohio EPA, and the U.S. EPA, issued on September 29, 1989 (amended in 1994 and 1997) (DOE 1999a). The site is divided into quadrants based on groundwater flow patterns to facilitate the investigation and cleanup. In 1998, DOE submitted a Cleanup Alternatives Study/Corrective Measures Study (CAS/CMS) for two of the quadrants. The Ohio EPA and U.S. EPA approved the CAS/CMS for Quadrant III on July 13, 1998, and Quadrant IV on October 18, 1998. The Quadrant I CAS/CMS was approved on June 12, 2000, and the final study for Quadrant II was submitted in August 2000 and accepted in January 2001.

1.2.4 Waste and Materials Management at PORTS

DOE-PORTS, through its Waste Management Program, oversees the management of waste generated from DOE operations and from environmental restoration projects. Under the USEC lease agreement, USEC pays DOE for storage of some waste generated by plant operations. However, USEC is responsible for waste treatment and disposal of ash generated wastes from their operations. Waste management requirements are varied and often complex because of the variety of wastes generated by DOE-PORTS activities, including radioactive, hazardous (chemical), polychlorinated biphenyls (PCBs), asbestos, industrial, and mixed (radioactive and hazardous) wastes. All DOE waste management activities are conducted in compliance with state and federal regulations. Supplemental policies also have been implemented for waste management. They include:

- minimizing waste generation;
- characterizing and certifying wastes before they are stored, processed, treated, or disposed;
- pursuing volume reduction and use of on-site storage (when safe and cost effective) until a final treatment and/or disposal option is identified; and
- recycling.

1.2.5 Reindustrialization Program

Several ongoing initiatives are underway at PORTS in coordination with the Southern Ohio Diversification Initiative (SODI), the recognized community reuse organization for PORTS. DOE's Office of Worker and Community Transition established community reuse organizations to minimize the negative effects of workforce restructuring at DOE facilities that have played an historic role in the nation's defense. These organizations provide assistance to the neighboring communities negatively affected by changes at these sites. Currently, an EA is being developed for the Reindustrialization Program at PORTS, DRAFT DOE/EA-1346, *Environmental Assessment, Reindustrialization Program at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*. This EA is for a proposed action to transfer real property (i.e., underutilized, surplus, or excess PORTS land and facilities) by lease and/or disposal (i.e., sale, donation, transfer to another federal agency, or exchange) via a reindustrialization program.

1.3 SCOPE OF THIS EA

DOE has prepared this EA to present the public with information on the potential impacts associated with the proposed action (installation and operation of a hot water heating facility with associated recirculating water pumps tied to an existing hot water distribution system, installation of a natural gas pipeline, and installation of approximately 900 electric space heaters in the three gaseous diffusion process buildings) and reasonable alternatives as well as to ensure that potential environmental impacts are considered in the decision-making process. DOE is required to assess the potential consequences of its activities on the human environment in accordance with the Council on Environmental Quality (CEQ) regulations [40 *CFR* Parts 1500–1508] implementing National Environmental Policy Act (NEPA) and DOE NEPA Implementing Procedures (10 *CFR* 1021). If the impacts associated with the proposed action are not identified as significant as a result of this EA, DOE would issue a Finding of No Significant Impact (FONSI) and would proceed with the action. If impacts are identified as significant, an Environmental Impact Statement would be prepared.

This EA (1) describes the existing environment at PORTS relevant to potential impacts of the proposed action and alternatives; (2) analyzes potential environmental impacts; (3) identifies and characterizes cumulative impacts that could result from PORTS in relation to other ongoing or proposed activities within the surrounding area; and (4) provides DOE with environmental information for use in prescribing restrictions to protect, preserve, and enhance the human environment and natural ecosystems.

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2. DESCRIPTION OF ALTERNATIVES

2.1 PURPOSE OF ACTION

DOE proposes to provide heating capability for winterization of facilities at PORTS located at Piketon, Ohio. Winterization of PORTS is necessary because of DOE's decision to place the plant in cold standby and facilities and systems must be protected from freezing. Freezing of facilities and systems would likely result in substantial and costly damage from freezing of fire protection systems; potential RCRA waste storage permit noncompliances due to lack of heat; and the potential for generating contaminated water or other materials requiring cleanup, processing, storage and/or disposal. Other impacts include lack of heating for facilities housing DOE and contractor staff, disruption of the RCRA Corrective Actions Program, and possible concerns with facilities containing HEU. In addition, NCS problems could result from the uncontrolled release of water from fire protection systems caused by freezing of sprinkler system lines in areas where UF_6 is present at various levels of enrichment.

2.2 PHYSICAL CHARACTERISTICS OF ALTERNATIVES EVALUATED

2.2.1 X-600 Coal Fired Steam Plant

Several variations of this alternative using the X-600 Coal Fired Steam Plant were investigated. Under this alternative, modifications to the X-600 Coal Fired Steam Plant would be required. The modifications would include:

- Placement of steam to water heat exchangers in the process buildings to replace process waste heat source obtained from the operating plant.

- Installation of an additional oil-fired boiler; oil-storage yard; and steam, condensate, and electrical connections would be required to provide normal heating requirements.

- Enhancements to the X-600 Coal Fired Steam Plant to improve efficiencies.

- Aboveground steam and condensate lines would require resizing and rerouting to the new heat exchanger.

- Smaller buildings that use the RHW to supply small hot water coil space heaters would be taken off the RHW and would be replaced with electric space heaters.

2.2.2 Electric Hot Water Boilers

Under this alternative, electric hot water boilers would be purchased and placed as required throughout the process, operations, and administrative buildings. Modifications would include:

- Larger facilities currently using RHW would be equipped with several large electric boilers that would maintain the existing RHW loop and circulating system inside each building.

- Hot water space heaters supplied with RHW, which are currently used to heat smaller buildings, would be replaced with electric space heaters.

2.2.3 New Hot Water Boiler System Supplied with Fuel Oil with the Potential for Conversion to Natural Gas and Electric Space Heaters and Vent Sealing in Process Buildings (Proposed Action)

Under the proposed action, modifications to Building X-3002 would be required. The modifications would include:

- Two 2000 boiler horsepower (BHP) hot water boilers with an option for an additional 1800 BHP hot water boiler would be installed in X-3002.
- A floor mounted exhaust stack would be installed for each of the boilers. The exhaust stacks would penetrate the roof of Building X-3002 90 ft above the floor elevation of the boilers and extend approximately 10 ft above the elevation of the roof.
- An RHW pumping system consisting of 4 recirculating pumps would be installed.
- Expansion tanks would be installed that are suitable to accommodate expansion of water in the recirculating system and the facilities the system serves.
- A tie-in for the supply and return RHW between the existing RHW piping system and the new RHW plant would be installed. The supply and return RHW piping would be routed aboveground from the boiler system to the RHW mains (supply and return lines) which are located underground external to Building X-3002.
- Equipment drains would be installed that allow drainage to be routed to the X-6619 STP.
- Supplemental area lighting would be provided as required for operation of new equipment.
- Forced air intake louvers would be installed to provide combustion air for the boilers.
- Building X-3002 roofing would be replaced in the area above the boilers and equipment.
- Electrical distribution systems would be installed to accommodate electrical power needs for the boilers, pumps, and other support equipment.
- Seal vents in process buildings.
- Install 900 electric space heaters in process buildings.
- A diked, fenced area would be installed that would contain the corrosion inhibitor system. This system would maintain acceptable corrosion inhibiting characteristics for the water within the RHW System.

In addition, modifications of other existing systems would include:

- A 24-ft wide oil storage yard access road would be constructed from Falcon Avenue to the oil storage filling area.
- A concrete pad would be constructed to support the oil filling station.

- Oil storage tanks would be installed in a concrete, diked storage area and would have sufficient capacity to contain a 72-hr supply of oil for all the hot water boilers at peak operation. A capacity of 120,000 gallons (gal) of #2 fuel oil would be required using three 40,000-gal tanks.

- Oil supply piping from the Oil Storage Yard to the boilers would be installed using existing overhead pipe supports where possible. All piping would be installed aboveground.

- Piping and valves would be installed, as necessary, to transform the existing RHW supply system (supplied by pumps located in Building X-330) into a closed loop system (supplied from the proposed RHW supply pumps and boilers in Building X-3002).

- At the X-330 building, a secondary existing RHW return line to the cooling towers would be drained and isolated from the RHW system.

- RHW system would be modified to transform the open-loop system, currently fed from the waste heat recovery system, to a closed-loop recirculating system fed from the proposed hot water boilers.

- RHW system would be modified to expose, drain, and cap the supply and return RHW headers to the cooling tower catch basins.

- Installation of a natural gas supply line from Zahns Corner to Building X-3002.

Areas surrounding buildings would be landscaped and maintained to preserve an aesthetically pleasing environment. There would be no conflicts between the proposed action and any future land use planning efforts that have been proposed for PORTS or the surrounding area.

2.2.4 No Action

Under the no-action alternative, ongoing operations would continue until USEC ceases uranium enrichment operations beginning in June 2001 and DOE places the GDP in cold standby. PORTS DOE Operations would continue without a heating supply for office buildings and operational facilities including RCRA Part B permitted waste storage facilities. The freezing of water lines, equipment damage caused by freezing, water damage, safety noncompliances, environmental noncompliances, and potential environmental insult would result in substantial environmental concerns and economic costs to DOE.

The impact of the no-action alternative would be further underutilization of remaining facilities and a less industrialized site.

2.3 RANGE OF REASONABLE ALTERNATIVES

This section discusses the alternatives considered for providing heat for PORTS facilities following the cessation of GDP operations at the site. The alternatives considered investigated all of the reasonable options for provision of a heating facility and included the use of the existing steam plant (which will continue to be used by USEC for the operation of autoclaves at the site); installation of electric boilers; and installation of a new hot water boiler system capable of being fired with #2 fuel oil or natural gas. Propane was also considered as a fuel alternative for the hot water boiler system; however, after reviewing the associated costs and assessing the numerous safety concerns, it was determined that propane fuel should not be give further consideration. See Table 2-1 for a comparison of construction, operating, and maintenance costs for each alternative evaluated (Tetra Tech 2000).

2.3.1 X-600 Coal Fired Steam Plant

Although USEC is curtailing operations at PORTS, the amount of steam required to heat transfer and shipping facilities will increase. As a result, the steam supply for USEC facilities that will continue operation is not sufficient to meet additional RHW requirements without substantial modification to the aged facility.

Several variations of this alternative using the X-600 Coal Fired Steam Plant were investigated. These included placement of heat exchangers in the process buildings to replace process waste heat currently used for these structures; installation of an additional boiler; and enhancements to the X-600 Coal Fired Steam Plant to improve efficiencies (Tetra Tech 2000).

A steam distribution system was used to heat several of the facilities on the GDP side of the plant before RHW was available; however, only a small steam supply line is routed to the GCEP side of the plant. If this alternative was selected, additional aboveground steam and condensate lines adequately sized and routed to the GCEP side of the plant would be required.

The steam distribution piping could be renovated and extended to serve the larger facilities inside the GCEP portion of the plant. Steam supplied by the renovated steam supply piping could be used to serve a facility heat exchanger that could be used with the existing RHW piping and circulation pumps to circulate hot water to the different heating coils inside these buildings as well. In addition, smaller buildings that use the RHW to supply small hot water coil space heaters could be taken off the RHW and steam. The hot water space heaters could be replaced with electric space heaters.

In general, sufficient steam from the steam plant is not available, and the cost associated with the required modifications would be prohibitive. In addition, excavation for required modifications would require generation of large volumes of potentially hazardous waste and may interrupt critical plant site operations.

2.3.2 Electric Hot Water Boilers

Electric hot water boilers could be purchased and placed as required throughout the process, operations, and administrative buildings. The costs for electricity to power these heating units would be substantial when compared to other alternatives (Tetra Tech 2000). In addition, electrical service in many of the facilities are inadequate to support this configuration.

The larger facilities currently using RHW would be equipped with a large electric boiler that would maintain the existing RHW loop and circulating system inside each building. Hot water space heaters supplied with RHW, which are currently used to heat smaller buildings, would be replaced with electric space heaters.

The advantage of using electric boilers in each facility would be the independence from the existing central systems. There would be no dependence on the steam plant or existing RHW system and its problem of corrosion, pipe breaks, and leaks.

The main disadvantage of this alternative would be the potential for disruption of operations as multiple modifications are completed. Processes and activities would be impacted during the construction phase of the project because a potential exists for disruption of RHW supply. Water makeup and corrosion inhibition devices would be required for each of these systems. In addition, the cost of utilities to power electric boilers would be substantial (Tetra Tech 2000).

2.3.3 New Hot Water Boiler System Supplied with Fuel Oil with the Potential for Conversion to Natural Gas and Electric Space Heaters and Vent Sealing in Process Buildings (Proposed Action)

This alternative would provide a solution for heating site structures and would mitigate facility and equipment damage as well as environmental and safety concerns prior to the onset of the winter season. This solution would allow for the heating of the facilities in a manner that is timely and would not interfere with safe and environmentally sound operation of the site. This alternative would also allow currently installed fire protection systems to operate without alteration. New hot water boilers, hot water supply pumps, and associated piping and equipment would comprise a new RHW Hot Water Boiler System at the X-3002 building that would produce and circulate hot water required to heat the GCEP and GDP facilities at PORTS currently heated by RHW. The new RHW Hot Water Boiler System would connect to the existing 36-in supply and return headers that currently supply GCEP. The new RHW Hot Water Boiler System would be sized for the peak demand of approximately 19,200 gallons per minute of hot water required for a heating load of approximately 194,179,000 British thermal unit (Btu)/hr to heat the GCEP and GDP areas (Tetra Tech 2000).

In addition, approximately 900 electric space heaters (300 space heaters in each building) would be installed to heat the three process buildings. Electric space heaters are currently used within these process buildings to provide heat to cold areas within the structures. The safety authorization basis for installation of additional electric space heaters would not require DOE or Nuclear Regulatory Commission (NRC) approval because electric space heaters are already present within the structures.

The proposed boiler system could operate on an array of combinations of oil and natural gas. These boilers could be easily switched from one fuel source to another and be operated in different combinations of fuel supply. For example, two boilers could be operated from natural gas at the same time the third is operated on fuel oil.

Natural gas would be the most cost efficient fuel for the hot water boilers. An underground natural gas transmission line originating at the Zahns Corner Industrial Park would be the closest point where natural gas could be supplied from a transmission line and from there the gas could be routed through the eastern side of the DOE Reservation. Figure 1.2 presents the proposed location for the new, underground, natural gas supply line. The proposed 350 pounds per square inch (psi) supply line would originate at Zahns Corner, cross under Route 32 near the Big Beaver Golf Course, continue south crossing under the railroad spur, closely following McCorkel Road to Dutch Run Road. At this point, the gas pressure would be reduced to approximately 100 psi. The pressure reduction facility would be located adjacent to the East Access Road of the DOE Reservation. Once on the DOE Reservation, the natural gas line would then continue along East Access Road and cross East Access Road and continue along Perimeter Road, south to a point aligned with Second Street where it would turn west. The natural gas line would cross the abandoned air field and continue along the south side (outside) of the security fence (also south of the railroad track). At this point, the gas line would enter the secured portion of the DOE Reservation and continue to the proposed Hot Water Boiler Plant at the X-3002 building. A metering and second pressure reduction station would be located as close to the Hot Water Boiler Plant as practical.

An aboveground oil storage and supply system to make up any interruption of natural gas supply would be installed. Three 40,000-gal tanks located within a diked area would make up an oil storage supply of 120,000 gal. This quantity of fuel oil would provide a source of fuel for all three boilers operating at peak capacity for a period of 72 hr. This alternate source of fuel should be considered due to the reliability and availability concerns of the natural gas supply for peak demands over an extended period (Tetra Tech 2000).

2.4 NO-ACTION ALTERNATIVE

The no-action alternative provides an environmental baseline with which impacts of the proposed action and alternatives can be compared. The no-action alternative must be considered even if DOE is under a court order or legislative command to act. See 10 *CFR* 1021.321(c). Under this alternative, PORTS DOE Operations would continue without a heating supply for office buildings and operational facilities including RCRA Part B permitted waste storage facilities. The freezing of water lines, equipment damage caused by freezing, water damage, safety noncompliances, environmental noncompliances, and potential environmental insult would result in substantial environmental concerns and economic costs to DOE.

Table 2.1. Comparison of Construction, Operating, and Maintenance Costs

Option	Construction Cost ($ millions)	Operation and Maintenance Costs Per Year (Base) ($ millions)
<u>NEW HOT WATER BOILER SYSTEM SUPPLIED WITH FUEL OIL WITH THE POTENTIAL FOR CONVERSION TO NATURAL GAS AND ELECTRIC SPACE HEATERS AND VENT SEALING IN PROCESS BUILDINGS</u> New RHW Hot Water Boiler System with Natural Gas Supply Lines; Fuel Oil Storage and Supply System; Heating Process Buildings X-326, X-330, and X-333 totally with Electric Space Heaters ***Proposed Action***	**$31.0 M**	**$15.8 M**
X-600 COAL FIRED STEAM PLANT Provide a Bank of Heat Exchangers in Building X-330 Fed From the Existing Steam Plant and Circulated With Existing Pumps, Modify Fire Protection System From a Wet to a Dry Type System ***Not Feasible – Inadequate steam supply available for heat exchangers***	**$67.8 M**	**$12.6 M**
ELECTRIC HOT WATER BOILERS Provide Electric Boilers at the Individual Facilities for RHW, Heating Process Buildings with Electric Space Heaters ***Not Feasible – The initial capital and operating cost is higher***	**$38.9 M**	**$20.2 M**
NO ACTION The costs of this option would be incalculable	—	—

3. AFFECTED ENVIRONMENT

3.1 LAND AND FACILITY USE

PORTS is situated on a 1503-ha (3714-acre) parcel of DOE-owned land (Fig. 1.2). The Perimeter Road surrounds a 485.6-ha (1200-acre) centrally developed area. The terrain surrounding the plant, except for the Scioto River floodplain, consists of marginal farmland and densely forested hills. The Scioto River floodplain is farmed extensively, particularly with grain crops.

The reservation land outside Perimeter Road is used for a variety of purposes, including a water treatment plant, holding ponds, sanitary and inert landfill, and open and forested buffer areas. The majority of the site improvements associated with the GDP are located within the 202-ha (500-acre) fenced area. Within this area are three large process buildings and auxiliary facilities that are currently leased to USEC. A second, large developed area covering about 121 ha (300 acres) contains the facilities built for GCEP. These areas are largely devoid of trees, with grass and paved roadways dominating the open space. The remaining area within Perimeter Road has been cleared and is essentially level. Controlled access exists within the limited security area as well as closed sites.

Approximately 190 buildings are located within PORTS as well as the utility structures on the site. In general, the X-100 through X-700 series of buildings are directly related to the gaseous diffusion process. Most of the buildings in this series are located within the 202-ha (500-acre) fenced area. The X-200 and X-300 series are the production buildings and related infrastructure facilities. Most of the buildings and infrastructure included in the X-1000 through X-7000 series of buildings are located within the 121-ha (300-acre) GCEP expansion area. The facilities containing the administrative activities include the facilities numbered in the X-100 series for the GDP and X-1000 series for the more recent construction. The facilities house such activities as administrative offices, engineering, cafeteria, medical services, security, and fire protection.

The X-500 series in the GDP and the X-5000 series in the GCEP area pertain to the power operations facilities. Included are switchyards, switch houses, valve houses, and test and repair facilities. The X-600 and X-6000 series of facilities are utility related functions. Included are a steam plant, well fields, pump houses, a water treatment plant, a sewage treatment plant (STP), and numerous cooling towers. In addition, dry air and nitrogen generation facilities are housed in the GDP process buildings. The X-700 and X-7000 series of buildings house chemical operations, a laboratory, maintenance shops, and numerous storage facilities. The major maintenance facility for the GDP is the X-720 building. The building contains more than 91,440 m^2 (300,000 ft^2) of space for various shop activities, offices, and storage of parts. The GCEP-equivalent facility is the X-7721 Maintenance, Stores, and Training Building located in the 121-ha (300-acre) expansion area. The X-7721 building contains more than 36,576 m^2 (120,000 ft^2) of space.

The uranium enrichment production and operations facilities at PORTS are leased by USEC. The lease between DOE and USEC is active through July 1, 2004, although some facilities may be returned to DOE on an earlier date. Besides the leased facilities, USEC also leases common areas that include ditches, creeks, ponds, and other areas (i.e., roads and rail spurs) necessary for ingress, egress, and proper maintenance of facilities.

3.2 CLIMATE AND AIR QUALITY

3.2.1 Climate

PORTS is located in the humid continental climate zone of North America and has weather conditions that vary greatly throughout the year. The mean annual temperature is about 12.7^{o}C (55^{o}F). Average summer and winter temperatures are 22.2^{o}C (72^{o}F) and 0^{o}C (32^{o}F), respectively. Record high and low temperatures are 39.4^{o}C (103^{o}F) and –32^{o}C (–25^{o}F), respectively.

Prevailing winds are out of the south–southwest and average 8.05 kilometers per hour (km/h) [5 miles per hour (mph)]. The highest monthly average wind speed, 17.7 km/h (11 mph), typically occurs in the spring. Total precipitation averages approximately 101.6 cm (40 in.) annually and is usually well distributed throughout the year. Fall is the driest season. Snowfall averages approximately 51.8 cm/year (20.4 in./year). Although snow amounts and frequencies vary greatly from year to year, an average 8 d/year have greater than 2.54 cm (1 in.) of snowfall.

3.2.2 Air Quality

The PORTS region is classified as an attainment area for the pollutants listed in the National Ambient Air Quality Standards (NAAQS). These standards are shown in Table 3.1. Primary standards protect against adverse health effects, while secondary standards protect against welfare effects such as damage to crops, vegetation, and buildings. The State of Ohio has adopted the NAAQS and regulations to guide the evaluation of hazardous air pollutants and toxins to specify permissible short- and long-term concentrations.

PORTS is located in a Class II prevention of significant deterioration (PSD) area. PSD regulations were established to prevent significant deterioration of air quality in areas that already meet the NAAQS. Specific details of PSD are found in 40 *CFR* 51.166. Among other provisions, cumulative increases in sulfur dioxide, nitrogen dioxide, and PM-10 levels after specified baseline dates must not exceed specified maximum allowable amounts. These allowable increases, also known as increments, are especially stringent in areas designated as Class I areas (e.g., national parks and wilderness areas) where the preservation of clean air is particularly important. All areas not designated as Class I currently are designated as Class II. The nearest Class I PSD area is the Dolly Sods Wilderness Area, which is approximately 280 km (174 miles) east of PORTS in West Virginia.

Airborne discharges of radionuclides from PORTS are regulated under the CAA National Emission Standards for Hazardous Air Pollutants (NESHAP). Releases of radionuclides are used to calculate a dose to members of the public (Sect. 3.11.1).

The majority of radiological emissions at PORTS result from the uranium enrichment process operated by USEC. In 1999, USEC reported emissions of 0.9 Ci (curie: a measure of radioactivity) from its 19 radionuclide sources. DOE-PORTS is responsible for two emission sources, the X-326 L-Cage glove box and the X-744G glove box. These glove boxes are used to repackage wastes or other materials that contain radionuclides. Emissions from these sources are based on waste analysis data and standard engineering procedures. Radiological emissions from these two DOE sources were 0.000064 Ci in 1999 (DOE 2000a).

Nonradiological releases to the atmosphere are permitted under the Ohio Permit to Operate regulations. Under Ohio regulations, the Ohio EPA can register small emission sources rather than issue a formal permit. DOE-PORTS had 5 permitted and 10 registered air emission sources at the end of 1999.

Table 3.1. Air quality standards

Pollutant	Averaging time	NAAQS (μg/m^3)		Allowable PSD increment (μg/m^3)[a]	
		Primary	Secondary	Class I	Class II
Sulfur dioxide	3 h[b]		1300	25	512
	24 h[b]	365		5	91
	Annual	80		2	20
Nitrogen dioxide	Annual	100	100	2.5	25
Ozone	1 h[c]	235	235		
	8 h[d]	157	157		
Carbon monoxide	1 h[b]	10,000			
	8 h[b]	40,000			
PM-10[e]	24 h[c]	150	150	8	30
	Annual	50	50	4	17
PM-2.5[fd]	24 h	65	65		
	Annual	15	15		
Lead	3 months[g]	1.5	1.5		

Note: Where no value is listed, there is no corresponding standard.

[a]Class I areas are specifically designated areas in which degradation of air quality is severely restricted; Class II areas have a less stringent set of allowable increments.

[b]Not to be exceeded more than once per year.

[c]Not to be exceeded more than one day per year on average over 3 years.

[d]The ozone 8-h standard and the PM-2.5 standards are included for information only. A 1999 federal court ruling blocked implementation of these standards, which the U.S. Environmental Protection Agency proposed in 1997.

[e]Particulate matter less than 10 µm in diameter.

[f]Particulate matter less than 2.5 µm in diameter.

[g]Calendar quarter.

NAAQS = National Ambient Air Quality Standard.

PSD = prevention of significant deterioration.

DOE-PORTS operates numerous small sources of conventional air pollutants such as nitrogen oxides, sulfur dioxide, and particulate matter. These emissions are estimated every 2 years for the Ohio EPA's biennial emission fee statement. Emissions of nonradiological air pollutants at PORTS are estimated using various U.S. EPA-approved procedures. In calculating air emissions, DOE assumes that each source emits the maximum allowable amount of each pollutant as provided in the permit or registration for the source. Under this worst-case scenario, DOE-PORTS estimated emissions of sulfur dioxide, nitrogen oxides, organic compounds, and particulate matter in 1999 to be 13 tons/year. Most of these worst-case emissions resulted from particulate (dust) emissions from the X-734 landfill closure. Worst-case air emissions excluding this source are no more than 1.5 tons/year (DOE 2000a).

The largest nonradiological airborne discharges from USEC sources are from the coal-fired boilers at the X-600 steam plant. The boilers are permitted by Ohio EPA with opacity, particulate, and sulfur dioxide limits. Electrostatic precipitators on each of the boilers control opacity and particulate emissions. In addition, the boilers emit nitrogen oxides and carbon monoxide. There are also minor contributions of these pollutants from oil-fired heaters, stationary diesel motors, and mobile sources (e.g., cars and trucks). Other air pollutants emitted from USEC operations include gaseous fluorides, water treatment chemicals, cleaning solvent vapors, and process coolants.

In October 2000, DOE collected data from a monitoring network of 15 air samplers. Data were collected both on-site at PORTS and in the area surrounding PORTS. The monitoring network is intended to assess whether air emission from PORTS affect air quality in the surrounding area. The air sampling stations measure americium-241, neptunium-237, plutonium-238, plutonium-239/240, plutonium-242, thorium-228, thorium-230, thorium-232, uranium-233/234, uranium-235, uranium-236, uranium-238, percent uranium-235, and total uranium. A background ambient air monitoring station is located approximately 21 km (13 miles) southwest of the site. The analytical results from air sampling stations closer to the plant are compared to background measurements. The average concentration of gross alpha, gross beta, and gaseous fluorides at sampling locations around PORTS appears to be similar to the background location except for one station located just west of the site.

3.3 GEOLOGY AND SOILS

3.3.1 Site Geology

The near-surface geologic materials that influence the hydrologic system at PORTS consist of several bedrock formations and unconsolidated deposits. The bedrock formations include (from oldest to youngest) Bedford Shale, Berea Sandstone, Sunbury Shale, and Cuyahoga Shale. The unconsolidated deposits of clay, silt, sand, and gravel compose the Minford Clay and Silt (Minford) member and the Gallia Sand and Gravel (Gallia) member of the Teays formation (DOE 1996a). Prior to the Pleistocene glaciation, the Teays River and its tributaries were the dominant drainage system in Ohio.

The preglacial Portsmouth River, a tributary of the Teays, flowed north across the plant site, cutting down through the Cuyahoga Shale and into the Sunbury Shale and Berea Sandstone, and deposited fluvial silt, sand, and gravel of the Gallia member of the Teays Formation (Fig. 3.1).

3.3.2 Bedrock geology

Bedrock consisting of clastic sedimentary rocks underlies the unconsolidated sediments beneath PORTS. The geologic structure of the area is very simple, with the bedrock (Cuyahoga Shale, Sunbury Shale, Berea Sandstone, and Bedford Shale) dipping gently to the east–southeast. No known geologic faults are located in the area; however, joints and fractures are present in the bedrock formations.

The Bedford Shale is the lowest stratigraphic unit encountered during environmental investigative activities at the site. Bedford Shale is composed of thinly bedded shale with interbeds and laminations of grey, fine-grained sandstone and siltstone. The typical depth to the top of this formation at PORTS is 21.3 to 30.5 m (70 to 100 ft) below ground surface (bgs). However, Bedford Shale outcrops are present in deeply incised streams and valleys within the reservation. The Bedford Shale averages 30.5 m (100 ft) in thickness.

The Berea Sandstone is a light grey, thickly bedded, fine-grained sandstone with thin shale laminations. The top 3.05 to 4.57 m (10 to 15 ft) consists of a massive sandstone bed with few joints or shale laminae. The Berea Sandstone averages 10.67 m (35 ft) in thickness; however, the lower 3.05 m (10 ft) has numerous shale laminations and is very similar to the underlying Bedford Shale. This gradational contact does not allow for a precise determination of the thickness of the Berea Sandstone.

Regionally, Berea Sandstone contains naturally occurring hydrocarbons (oil and gas) in quantities sufficient for commercial production. Generally, within Perimeter Road, the Berea Sandstone is the uppermost bedrock unit beneath the western portion of PORTS but is overlain by the Sunbury Shale to the east.

The Sunbury Shale is a black, very carbonaceous shale. The Sunbury Shale is 6.09 m (20 ft) thick beneath much of PORTS, but thins westward as a result of erosion by the ancient Portsmouth River, and is absent on the western half of the site. The Sunbury Shale also is absent in the drainage of Little Beaver Creek downstream of the X-611A Lime Sludge Lagoons and the southern portion of Big Run Creek, where it has been removed by erosion. The Sunbury Shale underlies the unconsolidated Gallia beneath the most industrialized eastern portion of the plant and underlies the Cuyahoga Shale outside of the Portsmouth River Valley.

The Cuyahoga Shale, the youngest and uppermost bedrock unit at the site, forms the hills surrounding PORTS. The Cuyahoga Shale has been eroded from most of the active portion of PORTS. It consists of grey, thinly bedded shale with scattered lenses of fine-grained sandstone and regionally reaches a thickness of approximately 48.77 m (160 ft).

3.3.3 Unconsolidated Deposits

Unconsolidated deposits in the vicinity of PORTS fill the ancient Portsmouth River Valley to depths of approximately 9.1 to 12.2 m (30 to 40 ft). The unconsolidated deposits are divided into two members of the Teays Formation, the Minford Clay and Silt and the Gallia Sand and Gravel.

Minford Clay and Silt. The Minford is the uppermost stratigraphic unit beneath PORTS. The Minford averages 6.1 to 9.1 m (20 to 30 ft) in thickness and grades from predominantly silt and very fine sand at its base to clay near the surface. The upper clay unit averages 4.88 m (16 ft) in thickness, is reddish-brown, plastic, and silty, and contains traces of sand and fine gravel in some locations. These thicknesses vary greatly as a result of construction cutting and filling operations, as discussed in the next paragraph. The lower silt unit averages 2.13 m (7 ft) in thickness, is yellow-brown and semiplastic, and contains varying amounts of clay and very fine sand.

Fig. 3.1. Schematic block diagram showing geology at PORTS.

During the initial grading of the site, the deposits within the Perimeter Road were reworked to a depth as great as 6.1 m (20 ft) by preconstruction cut and fill activity. In most cases, the fill is indistinguishable from the undisturbed Minford. The combination of construction activities, bedrock topography, and erosion by modern streams has influenced the areal extent and thickness of the Minford at PORTS.

Gallia Sand and Gravel. Prior to Pleistocene glaciation, the Portsmouth River meandered north through the valley currently occupied by PORTS and deposited the sand and gravel of the Gallia. The Gallia averages 0.9 to 1.22 m (3 to 4 ft) in thickness at the site and is characterized by poorly sorted sand and gravel with silt and clay. Channel migration and variation in depositional environments that occurred during deposition of the Gallia resulted in the variable thickness of the Gallia. The areas of thickest accumulation of Gallia may represent the former channel location and include areas under the southern end of the X-330 building and near the X-701B. Gallia deposits beneath PORTS are generally absent above an approximate elevation of 198 m (650 ft) above mean sea level (AMSL).

As a result of similar depositional environments and source material, deposits from modern streams at the site often are visually indistinguishable from Gallia deposits. The modern surface-water drainage also has eroded the unconsolidated sediments and resulted in locally thin or absent Gallia and Minford.

3.3.4 Surface Soil Description

According to the Soil Survey of Pike County, Ohio, 22 soil types occur within the PORTS property boundary with the predominant soil type being Omulga Silt Loam (U.S. Department of Agriculture 1990). Most of the area within the active portion of PORTS is classified as Urban land-Omulga complex with a 0 to 6% slope, which consists of Urban land and a deep, nearly level, gently sloping, moderately well-drained Omulga soil in preglacial valleys. The Urban land is covered by roads, parking lots, buildings, and railroads that are so obscure or alter the soil that identification of the soil series is not feasible.

The surface layer of Omulga Silt Loam is dark grayish-brown, friable (easily crumbled), and approximately 25.4 cm (10 in.) thick. The subsoil is approximately 137.2 cm (54 in.) thick and is composed of three portions: (1) a yellowish-brown, friable silt loam; (2) a fragipan (brittle, compacted subsurface soil) of yellowish-brown, mottled, firm, and brittle silty clay loam middle; and (3) a yellowish-brown, mottled, friable silt loam approximately 50.8 cm (20 in.) thick. The root zone generally is restricted to the zone above the fragipan and contains none of the Urban land soils. Well-developed soil horizons may not be present in all areas inside Perimeter Road because of cut-and-fill operations related to construction.

Prime farmland is land that has the best combination of physical and chemical characteristics for producing crops of statewide or local importance. Seven of the soils that occur within the PORTS property are listed in the Pike County Soil Survey as prime farmland soils. Prime farmland is protected by the Farmland Protection Policy Act which seeks "… to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmlands to nonagricultural uses…" [7 USC 4201(b)].

Seven soil types that occur within the DOE property boundary at PORTS are considered prime farmland in the Soil Survey of Pike County, Ohio. Of these, four soil types are found within four of the six areas that could potentially be transferred under the proposed action. These four soil types are the Omulga silt loam (0 to 3% slopes), Doles silt loam (0 to 3% slopes, where drained), Coolville silt loam (1 to 8% slopes), and Princeton fine sandy loam (3 to 8% slopes).

3.3.5 Seismicity

Geological studies conducted to determine the potential seismic hazard for PORTS have determined that only one fault is located within 40 km (25 miles) of the site, and no seismicity has been recorded on it and no recorded seismic events have occurred within 40 km (25 miles) of the site. The Kentucky River fault zone and the Bryant Station-Hickman Creek fault are located farther away from PORTS, the latter fault being roughly 96.5 km (60 miles) to the southwest. These faults bound the southern part of a north-to-northeast-trending area of seismicity in central and eastern Ohio. Soil testing for the GCEP facility indicated that the potential for earthquake-induced soil liquefaction is relatively low. The potential for soil-structure interaction (ground motion magnification) is also slight. Also, Pike County is not one of the political jurisdictions listed in Appendix VI of 40 *CFR* 264 for which compliance with seismic standards must be demonstrated (MMES 1994).

3.4 WATER RESOURCES

3.4.1 Groundwater

3.4.1.1 Site hydrogeology

The groundwater flow system at PORTS includes two water-bearing units (the bedrock Berea Sandstone and the unconsolidated Gallia) and two aquitards (the Sunbury Shale and the unconsolidated Minford). The basal portion of the Minford is generally grouped with the Gallia to form the uppermost and primary aquifer at the facility. The hydraulic properties of these units and groundwater flow at the site also have been well defined.

Groundwater recharge and discharge areas at PORTS include both natural and man-made recharge and discharge areas. Natural recharge to the groundwater flow system at PORTS comes from precipitation.

Land use and the presence of thick upper Minford clay and the Sunbury Shale effectively reduce recharge to underlying units. Recharge to the Minford and Gallia is reduced because a large percentage of the land is paved or covered by buildings. However, recharge to the Berea Sandstone from the overlying Gallia is increased as a result of the absence of the Sunbury Shale.

Groundwater flow at PORTS can generally be divided into four separate flow regions. Groundwater divides provide the basis for separation of the reservation into quadrants. The groundwater divides generally coincide with topographic highs along the center of the industrial complex (from south to north) and topographic highs radiating outward and separating the predominant surface water features draining the facility. The locations of the groundwater flow divides may migrate small distances in response to seasonal changes in precipitation and groundwater recharge. The rates of pumping the X-700/X-705 sumps and remediation wells can also influence the location of the groundwater divides in some areas.

Groundwater at PORTS discharges primarily to surface streams. Groundwater in the eastern and northern portions of the facility discharges to the East and North Drainage Ditches and to the Little Beaver Creek. In the southern portion of the facility, groundwater discharges to the Big Run Creek and to the unnamed Southwest drainage ditch. Along the western boundary of the site, the West Drainage Ditch serves as a local discharge area for all geologic units.

Groundwater recharge and discharge areas at PORTS also are affected by man-made features including the storm sewer system, the sanitary sewer system, the recirculating cooling water (RCW) system, water lines, and building sumps. The storm sewer system consists of numerous large-diameter culverts and pipes that drain surface water from discrete segments of the site. Groundwater collected by these drains is transported to the discharge point for each storm drain. Discharge points for the storm drains generally coincide with site National Pollutant Discharge Elimination System (NPDES) outfalls that eventually discharge to the surface water units described previously. The RCW and fire hydrant supply systems are pressurized to ensure proper transport of water. If these systems have leaks, they may locally act as sources of recharge to groundwater. Although recharge from these lines to groundwater is difficult to measure, overall groundwater directions are not affected. These systems are generally located within 1.8 to 3.7 m (6 to 12 ft) of the ground surface. The depth to groundwater generally is more than 3.7 m (12 ft) bgs. Consequently, these systems and their associated backfills are usually located above the local water table. On the basis of these factors, none of these systems appears to act as a major discharge conduit for groundwater. Man-made features that do have a major effect on groundwater flow at the site include a set of sumps located in the X-700 and the X-705 buildings, extraction wells in the vicinity of X-231B, X-701B, and groundwater interceptor trenches at X-749 and X-701B.

Groundwater is used as a domestic, municipal, and industrial water supply in the vicinity of PORTS. Most municipal and industrial water supplies in Pike County are developed from the Scioto River Valley buried aquifer. Groundwater in the Berea sandstone and Gallia sand formations that underlie PORTS is not used as domestic, municipal, or industrial water supplies. Domestic water supplies are obtained from either unconsolidated deposits in preglacial valleys, major tributaries to the Scioto River Valley, or from fractured bedrock encountered during drilling.

The PORTS reservation is the largest industrial user of water in the vicinity and obtains its water from the X-608, X-605G, and X-6609 water supply well fields, which are next to the Scioto River south of Piketon. The wells tap the Scioto River Valley buried aquifer. Total groundwater production averages 49.4 million liters per day (L/d) [13 million gallons per day (MGD)] for the entire site, including USEC activities (DOE 1999b).

3.4.1.2 Groundwater monitoring

Groundwater and surface water monitoring at PORTS was initiated in the 1980s. Groundwater monitoring has been conducted in response to regulatory requirements of the Ohio Administrative Code, RCRA closure documents, an Administrative Consent Order between DOE and the U.S. EPA, a Consent Decree between the DOE and the State of Ohio, and DOE orders.

Because of the numerous regulatory programs, the *Integrated Groundwater Monitoring Plan* (IGWMP) was developed to minimize the potential for confusion in interpreting requirements and to maximize resources for collecting the data needed for sound decision making and was designed to establish all groundwater monitoring requirements for PORTS. The IGWMP was reviewed and approved by Ohio EPA and implemented at PORTS starting on April 1, 1999. The IGWMP is revised as monitoring needs change. The latest approved version of the IGWMP was issued in January 2001.

The process of developing an integrated groundwater monitoring program at PORTS began by selecting or designating relatively large-scale contamination areas called groundwater Areas of Concern. Areas of Concern at PORTS are generally large areas containing multiple source/release sites contributing to physically contiguous or co-mingled contaminant plumes or remediation concerns that are the subject of corrective actions or RCRA closures.

In addition to the detection and assessment monitoring at PORTS, the integrated approach to groundwater monitoring includes perimeter exit pathway monitoring, sampling selected surface water locations and sampling PORTS water supply and surrounding residents' drinking water. Additional information and monitoring results are provided in the 2000 Groundwater Monitoring Report (DOE 2001).

In general, samples are collected from wells at each area listed above and are analyzed for metals, volatile organic compounds (VOCs), and radiological constituents. Data for the X-749A Classified Materials Disposal Facility (part of the Quadrant I Groundwater Investigative Area) and the X-735 Landfills are also statistically evaluated to determine whether the areas have impacted groundwater.

Groundwater plumes that consist of VOCs, primarily trichloroethene (TCE), are found at the X-749/X-120/Peter Kiewit Landfill, Quadrant I Groundwater Investigative Area, Quadrant II Groundwater Investigative Area, X-701B Holding Pond Area, and X-740 Hazardous Waste Storage Facility Area.

DOE received a Notice of Violation from Ohio EPA in June 2000 for the 1999 Annual Groundwater Report. Violations were specifically noted at the X-749A and X-735 Landfills for 1) failure to notify Ohio EPA of the exceedence of the upper tolerance limit for several parameters at one or more wells at each of the units within 75 days of sample collection, and 2) failure to submit a report within 105 days demonstrating that the exceedences resulted from a source other than the landfill or and error in sampling, analysis, statistical evaluation, or natural variation. DOE initiated an assessment monitoring program at the landfills in August 2000, while also continuing to collect information to support the assertion that the exceedences at the wells were due to natural variation.

Selected monitoring wells, monitoring frequency, and analytical parameters are included in the IGWMP for each of the groundwater areas of concern listed below:

<u>Quadrant I</u>

- X-749 Contaminated Materials Disposal Facility/X-120 Old Training Facility/Peter Kiewit Landfill,
- Quadrant I Groundwater Investigative Area/X-749A Classified Materials Disposal Facility,

<u>Quadrant II</u>

- Quadrant II Groundwater Investigative Area,
- X-701B Holding Pond Area,

<u>Quadrant III</u>

- X-616 Chromium Sludge Surface Impoundments,
- X-740 Hazardous Waste Storage Facility Area,

<u>Quadrant IV</u>

- X-611A Former Lime Sludge Lagoons, and
- X-735 Landfills.

Monitoring wells were selected to serve one or more of the following broad technical objectives: source/release monitoring, plume monitoring, and remedial-action-effectiveness monitoring. Source monitoring is designed to monitor as close as feasible to potential sources of groundwater contamination such as landfills and holding ponds. Plume monitoring is designed to assess the concentrations and extent of known contaminant plumes. Remedial-action-effectiveness monitoring is designed to evaluate the performance of interim remedial measures, corrective actions, or technology demonstrations. These broad technical purposes approximate the regulatory definitions of detection monitoring and assessment monitoring.

3.4.1.3 Groundwater treatment

In 2000, a combined total of approximately 20.7 million gal of contaminated groundwater was treated at the X-622, X-622T, X-623, X-624, and X-625 Groundwater Treatment Facilities. Approximately 129 gal of TCE were removed from the groundwater. All processed water is discharged through NPDES outfalls before exiting PORTS.

- X-622—TCE-contaminated groundwater from the X-231B southwest oil biodegradation plot, the X-749 contaminated materials disposal facility, and the Peter Kiewit groundwater collection system is processed at the X-622 treatment unit using activated carbon and green sand filtration.
- X-622T—At this treatment facility, activated carbon is used to treat contaminated groundwater from the X-700 chemical cleaning facility and the X-705 decontamination building. The contaminated groundwater is extracted from sumps located in the basement of each building.
- X-623—This groundwater treatment facility consists of an air stripper with off-gas activated carbon filtration and aqueous-phase activated carbon filtration. X-623 provides treatment for contaminated groundwater from the X-701B holding pond and three groundwater extraction wells in the X-701B plume area.
- X-624—TCE-contaminated groundwater from the X-237 interceptor trench associated with the X-701B plume is treated via an air stripper with off-gas activated carbon filtration, plus carbon filtration of the effluent water.
- X-625—Groundwater that is gravity fed to this facility (from a horizontal well associated with the X-749/X-120 groundwater plume and as part of an ongoing technology demonstration) is treated with various passive media such as iron fillings.

3.4.2 Surface Water

3.4.2.1 Site hydrology

PORTS is drained by several small tributaries of the Scioto River, which flows south to the Ohio River. Sources of surface water drainage include storm water runoff, groundwater discharge, and effluent from plant processes.

The largest stream on the site is Little Beaver Creek, which drains the northern and northwestern portions of the site before discharging into Big Beaver Creek. Little Beaver Creek is a small, high-gradient, unmodified stream that receives the majority of its flow from the X-230J7 East Holding Pond discharge through the East Drainage Ditch. Little Beaver Creek also receives effluent via the Northeast Drainage Ditch through the outfall from the X-230J6 Northeast Holding Pond and the North Drainage Ditch through the X-230L North Holding Pond Outfall. Substrates are predominantly slab boulders and bedrock at the upper reach to gravel and sand near the mouth. During parts of the year, intermittent flow conditions exist upstream from the X-230-J7 discharge. During these times the upstream section is composed of isolated pools with no observable flow (Ohio EPA 1998).

Big Run Creek, located in the southeastern portion of the site, receives outfall effluent from the X-230K Holding Pond at the headwaters of the stream. Big Run Creek continues southwest from the DOE property boundary until it discharges into the Scioto River, approximately 6.4 km (4 miles) from the site. The substrates are predominated by gravel and cobble, and the channel has remained unmodified. Because of the small stream size and high gradient, deep pools are absent. Big Run Creek often has intermittent flow during parts of the year (Ohio EPA 1993).

Two ditches drain the western and southwestern portions of the site; flow is low to intermittent. The West Drainage Ditch receives water from surface water runoff, storm sewers, and plant effluent. The unnamed southwest drainage ditch receives water mainly from storm sewers and groundwater discharge. These two drainage ditches continue west and ultimately discharge into the Scioto River.

3.4.2.2 Surface water monitoring

The quality of surface waters at PORTS is affected by wastewater discharges and groundwater transport of contaminants from land disposal of waste. Although bedrock characteristics differ somewhat among the watersheds of these surface waters, the observed differences in water chemistry are attributed to different contaminant loadings rather than to geologic variation (DOE 1999a). Water quality, radioactivity, and flow measurements are made at a number of stations operated by DOE. The frequency of surface water sampling (weekly, monthly, etc.) is specific to the analytes. Routine and permitted outfall samples are tested for radiological components (gross alpha, gross beta-gamma, technetium, and uranium), pH, flow, turbidity, TCE, oil and grease, heavy metals, fluorides, and phosphates.

Most surface water sampling at PORTS for nonradiological discharges is regulated by NPDES permits enforced by the Ohio EPA. NPDES permit limitations regulate all plant process effluent discharged to the environment. The DOE-PORTS NPDES permit was issued in 1995 and modified in 1996 and 1997. The DOE-PORTS NPDES permit expired on March 31, 1999. DOE submitted a permit renewal application to Ohio EPA in 1998 in accordance with Ohio EPA requirements. The old permit will remain in effect until Ohio EPA issues a new permit. The Ohio EPA and U.S. EPA also conducted the annual inspection of all DOE-PORTS outfalls in June 2000. No problems were noted during the inspection.

DOE has six discharge points, or outfalls, through which water is discharged from the site. Three outfalls discharge directly to surface water (unnamed streams that flow to the Scioto River and Little Beaver Creek), and three discharge to the USEC X-6619 STP before leaving the site through USEC outfall 003 to the Scioto River. USEC is responsible for 10 NPDES outfalls at PORTS. Seven outfalls discharge directly to surface water (unnamed tributary to Scioto River, Little Beaver Creek, Big Run Creek, and the Scioto River). Three discharge to the X-6619 STP and outfall 003.

DOE-PORTS Outfalls:

012 (X-2230M holding pond)
013 (X-2230N holding pond)
015 (X-624 groundwater treatment facility)
608 (X-622 groundwater treatment facility)
610 (X-623 groundwater treatment facility)
611 (X-622T groundwater treatment facility)

USEC Outfalls:

001 (X-230J7 holding pond)

002 (X-230K south holding pond)
003 (X-6619 STP)
004 [X-616 chromate treatment facility (inactive)]
005 (X-611B lime sludge lagoon)
009 (X-230L north holding pond)
010 (X-230J5 northwest holding pond)
011 (X-230J6 holding pond)
604 (X-700 biodenitrification facility)
605 (X-705 decontamination microfiltration system)

Surface water monitoring of the Big Run Creek, East Drainage Ditch, Little Beaver Creek, North Holding Pond, unnamed southwestern drainage ditch, and West Drainage Ditch is conducted quarterly to assess the effect of the discharge of groundwater to streams (as base flow) at PORTS. This monitoring helps to support assessment monitoring at X-231B and X-701B and post-closure monitoring at X-616, X-735, and X-749. These surface monitoring locations are part of the Groundwater Monitoring Program and are not considered part of the PORTS NPDES sampling program (DOE 1999a).

3.4.2.3 Surface water quality

Both DOE and USEC monitor NPDES outfalls for radiological discharges by collecting water samples and analyzing the samples for radionuclides. Samples are analyzed for total uranium, isotopic uranium, gross alpha radiation, gross beta radiation, technetium-99, plutonium-239/240, plutonium-238, neptunium-237, americium-241, and thorium-230. Samples are analyzed for gross alpha activity, gross beta activity, isotopic uranium, plutonium, americium, neptunium, technetium, and total uranium. In 1999, a total of 0.0079 Ci of radionuclides was discharged from DOE NPDES outfalls, and uranium discharges totaled 0.59 kg. Data collected by USEC and provided to DOE showed that USEC released 21.14 kg of uranium through its 10 NPDES outfalls during 1999. Total radioactivity released was 1.08 Ci (DOE 2000a).

The Ohio EPA also requires monthly collection of surface water samples from the X-745C and X-745E depleted UF_6 cylinder yards. Samples are analyzed for alpha activity, beta activity, and total uranium. During 1999, alpha activity ranged from less than 1 picocurie per liter (pCi/L) to 52 pCi/L, beta activity ranged from less than 3 pCi/L to 148 pCi/L, and total uranium ranged from 1.0 μg/L to 14.5 μg/L. Beginning in September 1999, samples also were analyzed for total PCBs, technetium, ^{241}Am, ^{243}Am, ^{237}Np, ^{238}Pu, and ^{239}Pu. These parameters were not detected at levels greater than the applicable detection limits (DOE 2000a).

Sampling of nonradioactive constituents is regulated under the NPDES permit. Analyses are performed in accordance with applicable regulations. The 1999 NPDES compliance rate for DOE outfalls was 100%, and compliance rates for individual parameters was also 100%. This EA does not include results for nonradiological monitoring of USEC NPDES outfalls.

Results of the 1998 surface water monitoring conducted in conjunction with groundwater assessment monitoring are as follows. No VOCs were detected at the sampling locations in Big Run Creek, Little Beaver Creek, East Drainage Ditch, North Holding Pond, or West Drainage Ditch, with the exception of small amounts of chloroform and other trihalomethanes that are common residuals in treated chlorinated drinking water. These streams received such treated water. TCE has been detected regularly at UND-SW01 within the unnamed southwestern drainage ditch at low levels since 1990 and was detected in 1998 at 2 to 3 μg/L. TCE was also detected downstream from UND-SW01 at 2 μg/L in the second quarter of 1998. Naturally occurring Sunbury shale chips and fines in the stream sediment contain trace concentrations of uranium, and these chips might account for the low uranium concentrations that were detected below preliminary remediation goals (PRGs) at many of the sampling locations in 1998. Gross alpha and beta activity was also detected at several sampling locations, but the activity was below PRGs (DOE 1999a).

3.5 FLOODPLAINS AND WETLANDS

3.5.1 Floodplains

Floodplains consist of mostly level land along rivers and streams that may be submerged by floodwaters. The Flood Insurance Rate Map (FIRM) provided by the Federal Emergency Management Agency (FEMA) indicates that the 100-year floodplain extends on both sides of Little Beaver Creek upstream from the confluence with Big Beaver Creek to the rail spur located near the X-230 J-9 North Environmental Sampling Station (Fig. 3.2). The 100-year floodplain ranges on either side of Little Beaver Creek from 15.24 to 60.96 m (50 to 200 ft) roughly following the 174.7-m (575-ft) topographic contour. Flooding is not a problem for the majority of the site. The highest recorded flood level of the Scioto River in the vicinity of the site was 570.0 ft AMSL (January 1913), which is approximately 100 ft below the level of most PORTS facilities. No portion of the floodplain for Big Beaver Creek is located within the PORTS boundary. The FIRM map for Big Beaver Creek indicates a Zone A designation at the point where the proposed natural gas pipeline would cross Big Beaver Creek. Zone A is described in the legend of the FIRM map as “No floodplain elevations have been established.” The width of the floodplain where the proposed natural gas pipeline would cross Big Beaver Creek is approximately 228.6 m (750 ft).

3.5.2 Wetlands

The U.S. Army Corps of Engineers (USACE) defines wetlands as “those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.” Wetlands usually include swamps, marshes, bogs, and similar areas. In identifying a wetland, three characteristics should be met. First is the presence of hydrophytic vegetation that has morphological or physiological adaptations to grow, compete, or persist in anaerobic soil conditions. Second, hydric soils are present and possess characteristics that are associated with reducing soil conditions. Third, site hydrology, meaning the area is inundated or saturated to the surface at some time during the growing season of the prevalent vegetation, must be present (USACE 1987).

PORTS contains 41 jurisdictional and 4 non-jurisdictional wetlands totaling 13.92 ha (34.36 acres) (DOE 1996b). Quadrant I has 13 jurisdictional wetlands totaling 5.22 ha (12.91 acres). Quadrant II contains three jurisdictional wetlands with a total area of 5.2 ha (12.86 acres). Quadrant III has 6 jurisdictional wetlands totaling 0.82 ha (2.02 acres), and Quadrant IV has 19 jurisdictional wetlands and 4 non-jurisdictional wetlands totaling 2.66 ha (6.58 acres). The majority of the wetlands are associated with wet fields, areas of previous disturbance, drainage ditches, or wet areas along roads and railway tracks. Table 3.3 provides information about the wetlands at PORTS. The location of all the wetlands is shown on Fig. 3.3.

3.6 ECOLOGICAL RESOURCES

3.6.1 Terrestrial Resources

The 10 terrestrial habitat types at PORTS are as follows (DOE 1997a):

- Old field areas—Early successional stage of disturbed areas dominated by tall weeds, shade-intolerant trees, and shrubs.

- Scrub thicket—Later successional stage covering old field areas dominated by dense thickets of small trees.

- Managed grassland—Open areas actively maintained and dominated by grasses.

- Upland mixed hardwood forest—Mesic to dry upland areas dominated by black walnut, black locust, honey locust, black cherry, and persimmon.

- Pine forest—Advanced successional stage following scrub thicket. The overstory is dominated by Virginia pine.

- Pine plantation—Nearly pure stands of Virginia pines.

- Oak-hickory forest—Well-drained upland soils. White oak and shagbark hickory are the most dominant of the oaks and hickories.

- Riparian forest—Periodically flooded, low areas associated with streams. Dominated by cottonwood, sycamore, willows, silver maple, and black walnut.

- Beech-maple forest—Undisturbed areas dominated by American beech and sugar maple.

- Maple forest—Dominated by sugar maple and other shade-tolerant species.

Fig. 3.2. 100-Year floodplain of Little Beaver Creek and Big Beaver Creek.

Fig. 3.2. 100-Year floodplain of Little Beaver Creek and Big Beaver Creek.

Table 3.3. Wetlands at PORTS

Wetland ID #	Status	ha/acre	Location	Comments
QI-01	Jurisdictional	0.133/0.328	West Perimeter Road	
QI-02	Jurisdictional	0.436/1.077	West Perimeter Road	
QI-03	Jurisdictional	0.778/1.922	West Perimeter Road	
QI-05	Jurisdictional	0.105/0.259	X-2207 parking	Drainage ditch
QI-06	Jurisdictional	0.093/0.230	X-749A landfill	Drainage ditch
QI-32	Jurisdictional	1.292/3.189	Former GCEP site	Wet field; former GCEP site
QI-33	Jurisdictional	0.012/0.029	West Perimeter Road	
QI-34	Jurisdictional	0.109/0.269	Former GCEP site	Wet field; former GCEP site
QI-35	Jurisdictional	0.151/0.374	Former GCEP site	Wet field; former GCEP site
QI-36	Jurisdictional	0.051/0.125	Former GCEP site	Wet field; former GCEP site
QI-37	Jurisdictional	1.874/4.626	Former GCEP site	Wet field; former GCEP site
QI-38	Jurisdictional	0.103/0.254	Former GCEP site	Wet field; former GCEP site
QI-39	Jurisdictional	0.092/0.228	Former GCEP site	Wet field; former GCEP site
QII-09	Jurisdictional	4.203/10.378	Little Beaver Creek	
QII-11	Jurisdictional	0.182/0.450	X-611A	Previous disturbance
QII-12	Jurisdictional	0.821/2.028	X-701B area	RAD area
QIII-27	Jurisdictional	0.047/0.117	West Perimeter Road	
QIII-29	Jurisdictional	0.015/0.036	West Perimeter Road	
QIII-30	Jurisdictional	0.194/0.480	X-744 N, P, and Q	Previous disturbance
QIII-31	Jurisdictional	0.042/0.103	X-615	RAD area
QIII-46	Jurisdictional	0.032/0.080	X-616	Drainage ditch
QIII-51	Jurisdictional	0.486/1.201	West Perimeter Road	
QIV-13	Jurisdictional	0.949/2.343	X-611A	Old borrow area
QIV-14	Non-jurisdictional	0.005/0.012	X-611B	Sludge lagoon
QIV-15	Non-jurisdictional	0.046/0.114	X-611B	Sludge lagoon
QIV-17	Jurisdictional	0.093/0.229	Fog Road	Natural area; past disturbance
QIV-18	Jurisdictional	0.130/0.322	North access road	Drainage ditch
QIV-19	Jurisdictional	0.181/0.447	North borrow area	Drainage ditch
QIV-20	Jurisdictional	0.158/0.389	North borrow area	Drainage ditch
QIV-21	Jurisdictional	0.066/0.163	X-735 landfill	Borders railroad track
QIV-22	Jurisdictional	0.007/0.018	X-7456 cylinder yard	Drainage ditch
QIV-23	Jurisdictional	0.024/0.006	Ruby Hollow	Natural area; past disturbance
QIV-24	Jurisdictional	0.018/0.044	Ruby Hollow	Natural area
QIV-25	Jurisdictional	0.038/0.094	Ruby Hollow	Natural area; past disturbance
QIV-26	Jurisdictional	0.065/0.160	X-752 Warehouse	Man-made ditch
QIV-40	Jurisdictional	0.145/0.359	X-611B	Man-made ditch
QIV-42	Jurisdictional	0.047/0.115	X-611B	Base of dam
QIV-43	Jurisdictional	0.048/0.119	X-611B	Base of dam
QIV-44	Jurisdictional	0.068/0.167	X-611B	Base of dam
QIV-45	Jurisdictional	0.08/0.201	X-747H landfill	RAD area
QIV-46	Jurisdictional	0.016/0.040	North borrow area	Borrow area
QIV-47	Jurisdictional	0.202/0.499	North borrow area	Drainage ditch
QIV-48	Jurisdictional	0.228/0.564	North borrow area	Drainage ditch
QIV-49	Non-jurisdictional	0.058/0.142	X-611B	Sludge lagoon
QIV-50	Non-jurisdictional	0.013/0.031	X-611B	Sludge lagoon

GCEP = Gas Centrifuge Enrichment Plant.
ha = hectare.
RAD = radioactive.
Source: Wetland Survey Report for the Portsmouth Gaseous Diffusion Plant, 1996b, POEF-LMES-106.

Fig. 3.3. Terrestrial and aquatic habitats (including wetlands) located at PORTS.

The habitat types covering the largest area on the reservation are managed grassland (30% of total area), oak-hickory forest (17%), and upland mixed hardwood forest (11%). The areas covered by each habitat type are listed in Table 3.4 and shown in Fig. 3.3. Several species of animals have been observed within the PORTS property boundary. A complete list of these species is presented in Appendix D and is summarized in this section.

Table 3.4. Terrestrial habitat types at PORTS

Habitat type	Approximate total area (ha/acre)	Approximate no. of communities	Percent of total area[a]
Managed grassland	446/110	Numerous[b]	30.0
Old field	170/420	10	11.4
Scrub thicket	32/79	10	2.2
Upland mixed hardwood forest	162/400	20	10.9
Pine forest	28/69	10	1.9
Oak-hickory forest	256/632	14	17.2
Riparian forest	62/153	10	4.2
Beech-maple forest	2/5	1	0.1
Maple forest	52/128	7	3.5
Old white pine plantation with mixed hardwoods	2/5	1	0.1

Source: DOE 1997a (DOE/OR/11/1668&D0).

[a]Total site area is 1486 ha (3714 acres). Approximately 252 ha (629 acres, 16.9%) of the total area are covered by buildings, parking lots, and roads. The remainder of the total site area contains aquatic habitat.

[b]This habitat is present in many areas interspersed between buildings and paved areas across the plant site.

Forty-nine mammals have ranges that include PORTS. Only 27 of those have been observed on the site. The most abundant mammals include white-footed mouse (*Peromyscus leucopus*) and short-tailed shrew (*Blarina brevicauda*). Larger mammals present include white-tailed deer (*Odocoileus virginianus*), eastern cottontail rabbit (*Sylvilagus floridanus*), and opossum (*Didelphis virginiania*) (DOE 1996c).

One hundred and fourteen bird species including year-round residents, winter residents, and migratory species have been observed on-site (DOE 1996c). The species include raptors [red-tailed hawk (*Buteo jamaicensis*)], water birds [mallard (*Anas platyrynchos*) and wood duck (*Aix sponsa*)], game birds [wild turkey (*Meleagris gallopavo*)], and non-game birds [nuthatches (*Sitta* sp.) and wrens (*Troglodytes* sp.)].

Eleven species of reptiles and six species of amphibians have been observed at the facility. The most common reptiles include eastern box turtle (*Terrapene carolina*), black rat snake (*Elaphe obsolete obsoleta*), and northern black racer (*Coluber constrictor*). The most common species of amphibians are American toad (*Bufo americanus*) and northern dusky salamander (*Desmognathus fuscus*) (DOE 1996c).

Common orders of insects found at PORTS include Homoptera (cicadas and aphids), Hymenoptera (bees, wasps, and ants), Diptera (flies), Coleoptera (beetles), and Orthoptera (grasshoppers) (Battelle 1976).

3.6.2 Aquatic Resources

Surface water aquatic resources at PORTS include creeks and drainage ditches. Little Beaver Creek and Big Run Creek provide drainage for a large portion of the facility. All aquatic resources at the facility are shown in Fig. 3.3. Sources of surface water are precipitation runoff, groundwater discharge, and effluent from plant processes. Most of the aquatic resources include populations of fish (58 species were collected around the facility), invertebrates, and periphyton. The outflow areas also are known to adversely affect the aquatic community of organisms. Some areas of ditches are devoid of aquatic insects and fish while other areas support only the most pollution-tolerant species.

In 1997, the Ohio EPA (Ohio EPA 1998) assessed Little Beaver Creek and found that non-attainment of the Warmwater Habitat (WWH) designation occurred upstream and immediately downstream from the X-230-J7 effluent discharge. Partial attainment was reached 0.97 km (0.6 miles) downstream from the X-230-J7 discharge, and in the lower reaches the stream fully attained WWH status. The lack of stream habitat combined with low water flow was determined to be the principal cause of the non-attainment of WWH status in the upper reaches, and not the effluent. The fish communities ranged from fair to exceptional condition in the Little Beaver Creek and ranged from good to exceptional downstream from the X-230-J7 discharge. The macroinvertebrate communities ranged from poor to exceptional. Poor ratings were assigned in the upstream areas where low flow or pollution stressed the community. Downstream areas of Little Beaver Creek contained exceptional macroinvertebrate communities and included high taxa diversity and a predominance of pollution-sensitive organisms. The most abundant fish taxa were central stonerollers (*Campostoma anomalum*), creek chubs (*Semotilis atromaculatus*), and bluntnose minnows (*Pimephales notatus*).

Big Run Creek is a typical headwater stream for the area. Prior to the relocation of 304.8 m (1000 ft) of the stream channel in 1994, it contained seven species of fish dominated by creek chubs and central stonerollers (Ohio EPA 1993). Macroinvertebrates consisted of chironomids, fly larvae, mayflies, stoneflies, caddisflies, beetles, damselflies, aquatic earthworms, and planaria (ERDA 1977).

The drainage ditches have not been well studied in the past. An unnamed western tributary has three species of fish typically associated with headwaters and contains fly larvae, caddisflies, beetles, and snails (ERDA 1977). Tributaries in the northwestern and southwestern portions of the facility have not had bioassessments performed on them.

3.6.3 Threatened and Endangered Species

The U.S. Fish and Wildlife Service (USFWS) and the Ohio Department of Natural Resources (ODNR), Division of Natural Areas and Preserves, provided information regarding threatened and endangered species at PORTS. Also, a comprehensive evaluation of the site for the presence of federal- and state-listed threatened and endangered species was conducted in 1996 (DOE 1997a). The USFWS has indicated that the Indiana bat (Myotis sodalis) is the only federally listed endangered animal species whose home range includes PORTS. Information from ODNR identified several state-listed threatened, endangered, and special interest species within 1 mile of the facility; however, their database does not show any species within the property boundaries of the facility.

Surveys were conducted for the presence of the Indiana bat in 1994 and 1996. As part of the 1996 survey, potential summer habitat for the Indiana bat was identified in the Northwest Tributary stream corridor, the Little Beaver Creek stream corridor, and along a logging road in a wooded area to the east of the X-100 facility. Mist netting was conducted in those areas in June and again in August. Although 14 bats representing four common species were captured during the August survey, no Indiana bats were collected. The survey also indicated that most of PORTS has poor summer habitat for Indiana bats. The few woodlands that occur on the property are small, isolated, and not of sufficient maturity to provide good habitat. The exception is an area of deciduous sugar maple forest along the Northwest Tributary stream corridor, where several of the bats were collected (DOE 1997a). The Northwest Tributary begins just southwest of the Don Marquis substation and flows approximately 3200 ft before leaving the DOE property prior to its confluence with Little Beaver Creek.

Historically, isolated sightings and observations of threatened, endangered, or special interest species have occurred at the facility. An Ohio endangered raptor, sharp-shinned hawk (*Accipiter striatus*), has been observed at the site in the past (DOE 1993). One Ohio endangered plant species, Carolina yellow-eyed grass (*Xyris difformis*), and a potentially threatened species, Virginia meadow-beauty (*Rhexia virginica*), have been found at the facility (DOE 1993; DOE 1996c). The rough green snake (*Opheodrys aestivus*), listed as an Ohio special interest species, has been observed at PORTS (DOE 1996c).

3.6.4 Environmentally Sensitive Areas

There are several environmentally sensitive areas within PORTS. These include areas where Ohio endangered or threatened species have been observed and wetland areas and the floodplain of Little Beaver Creek. There are no exceptional warm water streams within the facility.

- The Northwest Tributary stream corridor is considered a sensitive area because it represents the best habitat for bats at PORTS.

- The area near the X-611B sludge lagoon should be considered a sensitive area due to the possible presence of Carolina yellow-eyed grass, which was observed at PORTS in 1994 (DOE 1996b). Confirmation of this species is necessary, as the original identification occurred while the plant was not flowering.

- The area near the X-611A lagoon is a sensitive area because of the presence of Virginia meadow-beauty (*Rhexia virginica)* adjacent to the base of the dike. Wetlands also are present in this area.

None of these environmentally sensitive areas would be affected by the proposed action. There are no state or national parks, forests, conservation areas, wild and scenic rivers, or other areas of recreational, ecological, scenic, or aesthetic importance within the immediate vicinity of PORTS.

3.7 CULTURAL RESOURCES

Cultural resources are defined as any prehistoric or historic district, site, building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious, or any other reason. When these resources meet any one of the National Register Criteria for Evaluation (NRCE) (36 *CFR* Part 60.4), they may be termed historic properties and thereby are potentially eligible for inclusion in the National Register of Historic Places (NRHP).

Several draft cultural resource surveys have been prepared for DOE PORTS and will be evaluated in conjunction with the Ohio State Historic Preservation Office (SHPO) to determine properties that are eligible for including in the NRHP.

3.7.1 Archaeological Resources

PORTS is located within a region where Adena and Hopewell Indian mounds have existed. Additionally, several historic Native American Indian tribes are known to have had villages nearby.

Two preliminary Phase I archaeological surveys (Dobson-Brown et al. 1996; Schweikart et al. 1997) have been completed at PORTS. The combined surveys covered 836 ha (2066 acres) in Quadrants I through IV. There are few prehistoric archaeological resources at PORTS. Whether this is indicative of the local prehistoric upland settlement pattern or is a consequence of the extensive land disturbance associated with PORTS is not known. In contrast, historic archaeological resources in PORTS are relatively abundant, conspicuous, and undisturbed due to the nature and development of the facility.

Dobson-Brown et al. (1996) developed a predictive model of archaeological resource locations at PORTS based on variations in modern plant communities, topography, and soils, and on the location of previously identified archaeological resources in a 6.5-km (4-mile) literature review study area radius around the facility.

Survey methods in Quadrants I and II included visual inspection, surface collection, and hand excavation of shallow, <13 cm (<5 in.), shovel test pits. Similar shovel test pits inside the Perimeter Road area did not identify archaeological resources and indicated that this area has been highly disturbed.

Survey methods in Quadrants III and IV consisted of visual inspection, surface collection, hand-excavated shovel tests to 30 cm (12 in.) in depth in high-probability areas lacking significant disturbance and <15% slope. Additionally, hand-excavated deep shovel tests (>30 cm or 12 in.) were accompanied by 2-cm (0.75-in.)-diameter hand-coring in three areas in Quadrant IV along Little Beaver Creek. Portions of Quadrants I and II that were not investigated during the preliminary Phase I archaeological survey were also investigated by shallow shovel tests.

The combined Phase I archaeological surveys identified 39 archaeological resources (Tables E.1, E.2, and E.3) (see Appendix E). Nine of the resources contain prehistoric components. Five are identified as prehistoric isolated finds. Two are identified as prehistoric lithic scatters. Two contain prehistoric and historic components: a prehistoric isolated find in an historic cemetery and a prehistoric lithic scatter and historic farmstead. These sites are located in Quadrants I, II, and IV. No archaeological resources have been identified in Quadrant III. Thirty of the archaeological resources are associated with historic-era properties located within PORTS. Fifteen are remnants of historic farmsteads. Seven are scatters of historic artifacts or open refuse dumps. Two are isolated finds of historic artifacts. Four are remnants of PORTS structures. Two are historic cemeteries. One of the historic cemeteries has an associated chapel and remnant of a PORTS observation tower.

The draft cultural resource report (Schweikart et al. 1977) determined that 23 of the archaeological resources do not meet the NRCE (Table E.1) (see Appendix E). Insufficient data were collected at the remaining 14 archaeological components and two historic-era cemeteries, one of which (33 Pk 189; PIK-206-9) includes an associated historic archaeological component, to determine whether they meet the NRCE (Tables E.2 and E.3) (see Appendix E).

3.7.2 Architectural Historic Resources

Two architectural historic surveys have also been completed at PORTS (Dobson-Brown et al. 1996; Coleman et al. 1997). The combined surveys covered 1501 ha (3708 acres) and identified several structures that may have historical significance at PORTS (Table E.4) (see Appendix E).

A draft historic context for PORTS has also been prepared. This historic context is broken into four development periods for PORTS: Development Period 1 (1900–51), Development Period 2 (1952–56), Development Period 3 (1957–78), and Development Period 4 (1979–85). In the draft architectural survey report (Coleman et. al. 1997), recommendations were made concerning which buildings and structures were considered contributing and noncontributing resources to the PORTS historic property. DOE will evaluate these recommendations in conjunction with the Ohio SHPO to determine which buildings and structures are considered historic properties under the National Historic Preservation Act (NHPA) and whether any of the properties are eligible for inclusion in the NRHP.

3.8 SOCIOECONOMICS

The region of influence (ROI) for the PORTS analysis includes Jackson, Pike, Ross, and Scioto Counties, Ohio. The ROI includes the city population centers of Portsmouth, Chillicothe, and Jackson, as well as several rural villages such as Piketon, Wakefield, and Jasper (Fig. 3.4.).

3.8.1 Demographic Characteristics

3.8.1.1 Population

Population trends and projections for each of the counties in the ROI are presented in Table 3.5. Of the four counties, Scioto and Ross Counties have the largest populations, accounting for 37% and 35%, respectively, of the region's 1997 population. Jackson County accounts for 15%, and Pike County for the remaining 13%. The Ohio Department of Development (ODOD) projects that the population in the region will grow very slowly, increasing by less than 7% between 1997 and 2010 (ODOD 1999).

Table 3.5. PORTS ROI regional population trends and projections

County	1990	1997	2000	2010
Jackson	30,238	32,455	32,900	35,000
Pike	24,362	27,530	27,140	29,380
Ross	69,455	75,168	74,800	81,700
Scioto	80,385	80,744	82,500	84,700
Region	204,440	215,897	217,340	230,780
State	10,861,801	11,237,752	11,288,760	11,738,930

Sources: Bureau of Economic Analysis, 1999; ODOD, 1999.

Fig. 3.4. Region of influence for PORTS.

3.8.1.2 Minority and economically disadvantaged populations

The distribution of minority and economically disadvantaged populations was studied to address environmental justice concerns. Table 3.6 presents the distribution of minority populations by county in the four-county ROI. For the purposes of this analysis, a minority population consists of any area in which minority representation is greater than the national average of 24.2%. Minorities include individuals classified by the U.S. Bureau of the Census as Negro/Black/African-American, Hispanic, Asian and Pacific Islander, American Indian, Eskimo, or Aleut. Since Hispanics may be of any race, nonwhite Hispanics are included only in the Hispanic category, and not under their respective minority racial classifications. In all four counties, minority populations are smaller than the national average, ranging from a high of 8.9% in Ross county to a low of 1.2% in Jackson County (ODOD 1999).

Table 3.6. PORTS ROI distribution of minority populations, 1998

	Jackson		Pike		Ross		Scioto	
Race/ethnic group	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
White	32,159	98.8	27,185	97.9	69,246	91.7	77,647	96.6
Black	270	0.8	433	1.6	5,618	7.4	2079	2.6
Asian/Pacific Islander	74	0.2	74	0.3	420	0.6	200	0.2
American Indian	60	0.2	83	0.3	189	0.3	429	0.5
Hispanic (any race)	129	0.4	112	0.4	492	0.7	337	0.4
Total	32,563	100.0	27,775	100.0	75,473	100.0	80,355	100.0

Source: ODOD, 1999.

Since any adverse health or environmental effects are likely to fall most heavily on the individuals nearest PORTS, it is also important to examine the populations in the closest census tracts. Figure 3.5 illustrates the distribution of minority populations in the census tracts that immediately surround the PORTS. As of the 1990 Census, none of the tracts closest to the site had minority representation greater than the national average of 24.2% (Bureau of the Census 1990a). In Pike County, tract 9522 contained the largest proportion of minority residents at 4.9%. Only one census tract within the ROI includes a minority population; minorities represent 26.1% of the population in tract 9937 in Scioto County. This tract is near the center of the city of Portsmouth, approximately 37 km (23 miles) south of PORTS.

Table 3.7 presents the proportion of individuals with income below the poverty level, by county, in the four-county ROI. Figure 3.6 shows the location of low-income populations for the same area. In this analysis, a low-income population includes any census tract in which the percentage of persons with income below the poverty level is greater than the national average of 13.1% (Bureau of the Census 1990b). The Ohio average in 1990 was 12.5%. Nearly all (41 out of 48) of the census tracts in the four-county area qualify as low-income populations (Bureau of the Census 2000). The percent of persons below the poverty level ranges as high as 51.0% for tract 9936 in Scioto County. In Pike County, the proportion ranges from 10.8% in tract 9524 to 33.9% in tract 9527.

Table 3.7. Proportion of individuals with income below poverty level: PORTS ROI, 1989 and 1995

Area	Percent	
	1989	1995
Jackson County	24.2	17.5
Pike County	26.6	19.5
Ross County	17.7	15.1
Scioto County	25.8	21.4
State of Ohio	12.5	12.5
United States	13.1	13.1

Source: ODOD, 1999; Bureau of the Census, 1990b.

Fig. 3.5. Census tracts with minority population proportions greater than the national average of 24.2%.

Fig. 3.6. Census tracts with low-income population proportions greater than the national average of 13.1%

3.8.2 Employment

Regional employment data for 1992 through 1997 are summarized in Table 3.8. While total employment grew more than 16% during the 5-year period, unemployment rates within the region remained high. As Table 3.9 shows, the 1999 average unemployment rate for the ROI was 7.0%, compared to a statewide average of only 4.3%. Unemployment rates for individual counties ranged from 8.5% in Scioto and Pike counties to 5.1% in Ross County (Bureau of Labor Market Information 2000). Data for previous years show a persistent pattern of high unemployment rates throughout the region.

Table 3.8. PORTS ROI employment, 1992–1997

County	1992	1997	Percent change
Jackson	12,240	14,017	14.52
Pike	10,506	13,930	32.59
Ross	29,428	33,944	15.35
Scioto	28,802	32,218	11.86
Region	80,976	94,109	16.22
Ohio	5,906,639	6,596,769	11.68

Source: Bureau of Economic Analysis, 1999.

Table 3.9. PORTS ROI annual average unemployment, 1999

County	Employed	Unemployed	Total	Unemployment rate (%)
Jackson	13,600	1,000	14,600	6.8
Pike	10,600	1,000	11,600	8.6
Ross	32,900	1,800	34,700	5.2
Scioto	30,100	2,800	32,900	8.5
Total	87,200	6,600	93,800	7.0
Ohio	5,503,000	246,000	5,749,000	4.3

Source: Bureau of Labor Market Information, 2000.

In 1997, 2340 (91%) of the 2550 DOE-related workers lived in the four-county impact region (SODI 1997). These workers represented about 2.6% of the total ROI employment shown in Table 3.8. Table 3.10 shows the distribution of DOE-related employment across the ROI counties for that year. Scioto County held the largest share of the region's DOE-related employment with 51%, followed by Pike County with 23% and Ross County with 15%. Jackson County accounted for the remaining 10%.

Table 3.10. Distribution of DOE-related employment in ROI, 1997

County	1997 Employment	Percent
Jackson	244	10
Pike	544	23
Ross	362	15
Scioto	1190	51
Region	2340	100

Source: SODI, 1997.

Currently the total site employment at PORTS is approximately 2092. USEC employs about 1725 people while DOE, BJC, and various subcontractors employ approximately 367 people.

3.8.3 Income

Between 1992 and 1997, total regional income grew by 27% from approximately $2.9 billion to nearly $3.7 billion (Bureau of Economic Analysis 1999). Per capita income data for the region and the state are shown in Table 3.11. Per capita income in all four counties was well below the state average in both 1992 and 1997, continuing a long established trend. From 1992 to 1997, per capita incomes in the relevant counties grew between 19 and 25%, compared to a statewide increase of 24%. In 1997, it was estimated that PORTS accounted (directly and indirectly) for about $185 million of that income, about 5% of the total. The share of wages and salaries in individual counties ranged from 2.4% in Ross County to 15.2% in Pike County (Henderson 1997).

Table 3.11. Measures of per capita income for the PORTS ROI

Area	Per capita income		Percent increase
	1992 ($)	1997 ($)	
Jackson County	13,245	16,392	24
Pike County	13,292	15,783	19
Ross County	14,896	17,900	20
Scioto County	13,422	16,824	25
State of Ohio	19,482	24,163	24

Source: Bureau of Economic Analysis, 1999.

3.8.4 Housing

In 1990 vacancy rates in the region ranged between a low of 7% in Ross County to a high of 10% in Jackson County (Bureau of the Census 2000). Among all occupied housing units in the region, approximately 70% were owner occupied. The median home value was similar in all four counties, ranging between $37,000 and $49,600. Rents ranged from $281 to $317 across the ROI (Table 3.12).

Table 3.12. Housing summary for the PORTS ROI, 1990, by county

	Jackson County		Pike County		Ross County		Scioto County	
	Number	%	Number	%	Number	%	Number	%
Total housing units	12,452	100	9,722	100	26,173	100	32,408	100
Occupied	11,260	90	8,805	91	24,325	93	29,786	92
Vacant	1,192	10	917	9	1848	7	2,622	8
Median home value	$38,700	NA	$42,600	NA	$49,600	NA	$37,000	NA
Gross rent	$283	NA	$297	NA	$317	NA	$281	NA

NA = Not applicable.
Sources: U.S. Bureau of the Census, 2000; U.S. Bureau of the Census, 1990a.

3.8.5 Education

Summary figures for the school districts within the four-county ROI are shown in Table 3.13. The highest per-student expenditures occur in Scioto County, which spent an average of $5849 per student during the 1997–1998 school year (ODOD 1999).

Table 3.13. Public school statistics in the PORTS ROI, 1997–1998 school year

County	Number of schools	Student enrollment[a]	Teachers[a]	Teacher/student ratio	Per-student expenditures
Jackson	17	6,020	347	1:17	$5,082
Pike	13	5,861	320	1:18	$5,385
Ross	30	12,444	691	1:18	$5,544
Scioto	37	14,549	923	1:16	$5,849

[a]Full-time equivalent figures, public schools only.
Source: ODOD, 1999.

3.8.6 Health Care

There are three general hospitals currently serving the region. Average statistics for the hospitals indicate that there are approximately 442 routine-care hospital beds in the region, about 53% of which are available on any given day. This capacity is considered adequate to serve the health needs of the local population (The American Hospital Directory 1999).

3.8.7 Police and Fire Protection

The Protective Forces at PORTS provide physical security services at the site. However, the Pike County Sheriff provides limited patrols of Perimeter Road. USEC and DOE both have mutual aid agreements for fire protection, emergency squad, and medical services, primarily with Scioto Township and Seal Township. The Seal Township fire department plans to add a second fire station to better protect the nearby Zahn's Corner Industrial Park.

3.8.8 Fiscal Characteristics

The State of Ohio imposes an income tax, and the state constitution requires that at least 50% of the income tax collected from individuals be returned to the county of origin. Transfers back to the county are distributed as follows: 4.2% to the local government fund, 0.6% to the local government revenue assistance fund, 5.7% to the library and local government support fund, and 89.5% to the general revenue fund of the county. Ohio law allows the imposition of a local sales tax on retail sales, the rental of tangible personal property, and selected services. The local permissive sales tax is 1.5% in Ross County, and 1.0% in each of the other three counties. Intergovernmental transfers back to the county in which the tax is collected are distributed as follows: 4.2% to the local government fund and 0.6% to the local government revenue assistance fund.

There is also an optional tangible personal property tax on machinery, equipment, and inventories. Revenue is distributed to the counties, municipalities, townships, school districts, and special districts according to the taxable values and total millage levied by each. For the state as a whole, school districts receive roughly 70% of the total tangible personal property tax collected (Henderson 1997).

In 1997, Henderson estimated that activities at PORTS and wages paid to its employees accounted for $3.2 million in tax revenues returned to the region, including $2 million from income taxes and $1.2 million from sales taxes (Henderson 1997).

3.9 INFRASTRUCTURE AND SUPPORT SERVICES

3.9.1 Transportation

PORTS is served by Southern Ohio's two major highways: U.S. Route 23 and Ohio State Route 32 (Fig. 1.1). These highways are located within 1.6 km (1 mile) of the site. Access is by the Main Access Road, a four-lane interchange with U.S. Route 23, and the North Access Road, two lanes transitioning to four lanes with an at-grade interchange with Ohio State Route 32. These access routes easily accommodate PORTS traffic flow. The site is 5.6 km (3.5 miles) from the intersection of the U.S. Route 23 and Ohio State Route 32 interchange. Both routes are four lanes with U.S. Route 23 traversing north–south and Ohio State Route 32 traversing east–west. Two other access routes also serve the site. The East Access Road is a two-lane county road that disperses traffic to a county road network east and southeast of PORTS. Access to Ohio State Route 32 is also available by this network. South Access Road is also a two-lane road that disperses traffic to the south and southeast. South Access Road also intersects U.S. Route 23 south of the site. Approximately 113 km (70 miles) north of the site, U.S. Route 23 intersects I-270, I-70, and I-71. Trucks also may access I-64 approximately 32.2 km (20 miles) southeast of Portsmouth.

North Access Road has a daily traffic load of approximately 2383 vehicles. East Access Road has a daily traffic load of 802 vehicles. South Access Road has a daily traffic load of 1579 vehicles. The Main Access Road has a daily traffic load of 592 vehicles. (Traffic in both directions is included in these values.) These roads are congested during shift change; however, traffic flows at posted speed limits and a projected 40% increase in vehicles are feasible without staggering shifts or upgrades to roads. These data were provided by the Pike County Engineer's office from a 1999 traffic study. Load limits on these routes are controlled by the Ohio Revised Code at 85,000-lb gross vehicle weight. Special overload permitting is available.

U.S. Route 23 has an average daily traffic volume of 13,990 vehicles. Ohio State Route 32 has an average daily volume of 7420 vehicles (traffic in both directions is included in these values). U.S. Route 23 is at 60% of design capacity with Ohio State Route 32 at 40% of design capacity. The Ohio Department of Transportation supplied this data from a 1999 traffic study. Load limits on these routes is controlled by the Ohio Revised Code at 85,000-lb gross vehicle weight. Special overload permitting is available.

The PORTS road system is in generally good condition due to frequent road repaving projects. Except during shift changes, traffic levels on the site access roads and Perimeter Road are low. Peak traffic flows occur at shift changes and the principal traffic problem areas during peak morning/afternoon traffic are at locations where parking lot access roads meet the Perimeter Road. The site has 12 parking lots varying in capacity from approximately 50 to 800 vehicles. Total parking capacity is for approximately 4400 vehicles.

PORTS has excellent rail access, and several track configurations are possible within the site. The Norfolk Southern rail line is connected to the CSX main rail system via a rail spur entering the northern portion of the site. The on-site system primarily is used for the movement of large UF_6 cylinders on flatcars. Primary tracks that handle UF_6 cylinder traffic are maintained in good condition by USEC. The secondary tracks within the site receive minimal attention. The GCEP area is also connected to the existing rail configuration. Track in the vicinity of Piketon, Ohio, allows a maximum speed of 96.6 km/h (60 mph). The CSX system also provides access to other rail carriers.

PORTS can be served by barge transportation via the Ohio River at the ports of Wheelersburg, Portsmouth, and New Boston. The Portsmouth barge terminal bulk materials handling facility is available for bulk materials and heavy unit loads. All heavy unit loading is by mobile crane or barge-mounted crane at an open air terminal. The Ohio River provides barge access to the Gulf of Mexico via the Mississippi River or the Tennessee–Tombigbee Waterway. Travel time to New Orleans is 14 to 16 d; to St. Louis, 7 to 9 d; and to Pittsburgh, 3 to 4 d. The USACE maintains the Ohio River at a minimum channel width of 243.8 m (800 ft) and a depth of 2.74 m (9 ft).

PORTS is relatively isolated from commercial air service. There are 14 major carriers that provide 300 flights per day to 89 cities serving the Greater Cincinnati International Airport, which is 160.9 km (100 miles) to the west. The Port of Columbus International Airport (160.9 km or 100 miles north) is served by 17 airlines providing 250 flights daily. The Tri-State Airport (88.5 km or 55 miles southeast), Huntington, West Virginia, is served by 4 airlines and 18 flights per day. The Portsmouth Regional Airport, serving private and charter aircraft is 30.58 km (19 miles) southeast, near Minford, Ohio. The Pike County Airport, located near Piketon, is a small facility for private planes. The Pike County Aviation Authority has proposed a capital improvement program to improve and enhance airport services.

3.9.2 Utilities

3.9.2.1 Electricity and natural gas

PORTS is supplied electricity by the Ohio Valley Electric Corporation (OVEC) under a long-term contract that runs through 2003. OVEC operates two coal-fired power plants (Kyger Creek and Clifty Falls on the Ohio River) that were built for and dedicated to serving PORTS. Their combined generating capacity is comparable to the PORTS design load of 2260 megawatts (MW) although the DOE-OVEC contract calls only for a firm power supply of 1940 MW. According to the DOE-USEC Lease Agreement, DOE continues to administer the power contracts that supply electric service to PORTS. USEC pays DOE for purchased power, which in turn pays the power suppliers who are under an existing contract.

There are four switchyards on the site. The Don Marquis Substation, which covers approximately 10.52 ha (26 acres) on the crest of a hill northwest of Perimeter Road, is a high-voltage station operated and maintained by the OVEC. High-voltage electrical power (345 kV) is received from overhead power lines at the X-533 and X-530 switchyards. High-voltage oil circuit breakers and gas circuit breakers provide line switching capability and fault protection, and large oil-filled transformers step down the power to 13.8 kV. Air circuit breakers at the X-533 and X-530 switch houses provide protection and control for the numerous 13.8-kV distribution feeders leading to the GDP process buildings, auxiliary buildings, and substations. Construction in the GCEP area included additional 345-kV circuit breakers in the northern section of the X-530 switchyard. The newer high-voltage breakers and existing X-530 breakers feed 345 kV to the X-5000 switchyard through oil-filled 345-kV underground feeder cables. The switching arrangement provides a highly reliable source of power for GCEP. At X-5000, oil-filled 345/13.8-kV transformers feed power to the 13.8-kV air circuit breakers in the X-5000 switch house that control and protect the distribution circuits serving the GCEP area facilities.

The various high-voltage overhead power lines connecting Don Marquis, X-530, and X-533 with each other and with the external power grid are owned and maintained by OVEC. The underground high-voltage system of the underground 345-kV feeders from X-530 to X-5000 are owned by DOE and leased to USEC.

Power is distributed from X-533 to X-333 and from X-530 to X-330 through 13.8-kV distribution cables. Some cables run through underground duct banks, and some are supported by aboveground cable trays. The feeder cables from X-530 to X-326 are all located in underground duct banks. Most of the major GDP facilities receive 13.8-kV power through underground duct banks. A 13.8-kV overhead power system supported by wooden poles provides power to the well fields, sanitary landfill, X-611 water treatment plant, several warehouses, and several other facilities. A 2400-V overhead system provides power for street lighting and security fence lighting.

Natural gas is not currently provided at the plant site, and small amounts of fuel oil are used. Several outlying buildings are not supplied by the steam or RHW systems. These buildings are space heated with fuel oil. Natural gas service is available from Pike Natural Gas Company's main gas line near Zahn's Corner, Ohio, approximately 8 km (5 miles) north of the site. The proposed action would install a natural gas service that can be utilized by the PORTS site.

3.9.2.2 Steam distribution system

Steam is used in gaseous diffusion operations to vaporize UF_6, obtain UF_6 samples from cylinders, maintain process temperatures, clean equipment, heat sanitary water, and provide heat for process and support operations. During the fall and winter months, some steam also is used for space heating.

Steam is generated at the X-600 steam plant, which contains three coal-fired boilers and electrostatic precipitators, each capable of providing steam at 56,699 kg/h (125,000 lb/h) at 125 psi. The steam plant contains the normal support equipment for boiler operation such as coal and ash handling equipment and boiler feedwater treatment equipment. Coal is stored in the adjacent X-600A coal pile yard. All runoff from the coal yard and wastewater effluents from the steam plant are treated for pH adjustment and heavy metal removal at the X-621 coal pile runoff treatment facility. Treated effluent flows into the South Holding Pond. Sludge generated at X-621 is buried in the X-735 landfill. The coal supplier hauls coal ash off-site under a contractual agreement.

Steam is distributed to most major GDP facilities through aboveground insulated pipes. Parallel piping is provided to return condensate to X-600. Steam usage within the GCEP area is minimal. Steam and condensate return piping in this area is aboveground with a single 15.24-cm (6-in.) supply line tapped into both the east and west supply headers at X-600. New boilers installed as part of the proposed action would supply heating capabilities to buildings that would otherwise have no heating source subsequent to placing the PORTS facility in cold standby.

3.9.2.3 Water systems

PORTS requires a reliable supply of large amounts of water for process cooling, fire protection, and sanitary use. During plant construction, the X-605G well field and the X-605H booster station were installed to supply water for construction and for subsequent sanitary consumption. From plant startup in 1955 until 1965, water was routinely taken from the Scioto River at the X-608 pumphouse, 6.44 km (4 miles) northwest of the site, and transported through a single 120-cm (48-in.) reinforced concrete pipeline to the site.

Additional well fields were constructed to supply high-quality groundwater as a substitute for the poorer quality river water. However, the capability of pumping river water was retained for emergency use. The X-608A well field entered service in 1965, and the X-608B well field followed in 1975. Both are adjacent to the X-608 pumphouse. Water flows from these well fields to the X-611 water treatment plant on the site through the 120-cm (48-in.) concrete pipeline. Water from the original well field, X-605G, flows through a 25-cm (10-in.) plastic tie line into the 120-cm (48-in.) line.

The X-605 and X-608 well fields contain 19 wells with a total pumping capacity of almost 114 million L/d (30 MGD). However, because of aquifer condition, periodic silting and encrustation of the wells, as well as normal maintenance outages, their combined reliable pumping capacity is between 57 and 66.5 million L/d (15 and 17.5 MGD).

The X-6609 well field, constructed to support the GCEP, is composed of 12 wells with a design capacity of 32.68 million L/d (8.6 MGD). The X-6609 raw water supply is carried to the X-611 water treatment plant through a 75-cm (30-in.) line. Water from X-605 flows to X-611 through a tie line into the 75-cm (30-in.) line from X-6609. At X-611, the water is treated with lime to remove a major portion of its carbonate hardness and a polymer for coagulation of precipitated solids. Following this softening process, treated water flows directly into the basins of the GDP cooling towers to "make-up" for evaporation and blowdown losses from the RCW system. The system, which consists of seven cooling towers, three pumphouses, and supply and return headers paralleling the three process buildings, is used to remove excess heat from the diffusion process.

Within the GCEP area, the principal elements of the Cooling Tower Water System consist of a pumphouse, cooling tower, and distribution piping. The system can remove heat from the closed-loop Machine Cooling Water Systems and from air conditioning condensers in various facilities.

Following the softening process at the X-611 water treatment plant, a portion of the water receives additional treatment for use as sanitary water within the facility. At X-611, the water is chlorinated, the pH is adjusted, and the water is treated with a phosphate compound for corrosion control. Residual suspended solids and bacteria are removed in the X-611C filter house, which contains four sand filters having a combined rated capacity of approximately 15.2 million L/d (4 MGD).

At the X-611C filter house, pumps discharge filtered water into the sanitary water distribution piping system. The X-612 elevated water tank has a 950,000-L (250,000-gal) capacity. X-612 is used to maintain a stable pressure for the system (approximately 85 psi).

The fire protection sprinkler systems for all GDP facilities, except the three process buildings and their respective cooling towers, are fed from the sanitary water system. There are separate piping systems within each building for sanitary purposes and fire protection. Fire hydrants throughout the site feed directly off the sanitary water distribution piping.

The primary supply of sanitary water for the GCEP area is directly from X-611 through a pipeline that parallels Perimeter Road to the X-6644 sanitary and firewater pumphouse. The X-6613 sanitary water storage tank, one of three 7.6-million-L (2-million-gal) concrete tanks, is used for buffer capacity. Booster pumps within X-6644 supply sanitary water to the GCEP area facilities and to the GDP area through several connections with the GCEP piping system.

A separate high-pressure firewater distribution system for the sprinkler systems in the three GDP process buildings and their respective cooling towers was constructed in 1959. The system is fed from the RCW make-up water line leading from X-611 and into the X-640-1 firewater pumphouse. Pumps within X-640-1 are used to maintain an appropriate water level in the X-640-2 elevated storage tank, which has a capacity of 11.14 million L (300,000 gal). The tank has a height of 91.44 m (300 ft), which maintains the system pressure at approximately 125 psi.

The high-pressure firewater system was extended to provide fire hydrant and sprinkler system feed water for the GCEP area. Sanitary water flowing from X-611 to the X-6644 sanitary and firewater pumphouse can be valved to two firewater storage tanks that provide 15.2 million L (4 million gal) of backup capacity. Booster pumps within X-6644 feed water into the firewater distribution piping system throughout the newer facilities. Cross-connections also exist with the GDP high-pressure firewater piping around X-326. The GDP/GCEP area high-pressure firewater system is considered one system with each site serving as a backup to the other.

3.9.2.4 Wastewater treatment

The PORTS X-6619 STP is located in Quadrant III. The plant was built in 1980 and became operational in 1981. It is comprised of four reinforced concrete buildings (screen building, sludge pumping building, filter building, and chlorine building), totaling approximately 1524 m^2 (5000 ft^2); two circular clarifiers; four aeration tanks; two aerobic digesters; and five sludge drying beds.

The PORTS sanitary sewers feed by gravity into one of six lift stations around the plant site or feed directly to the X-614A Pump Station on X-6614J Sewage Lift Station. The sewage collection system is constructed of vitrified clay tile. The lines from the Lift Stations to the X-614A Pump Station are vitrified clay pipe, and the force main from X-614A to the X-6619 Sewage Treatment Facility is cast-iron pipe. The lift stations and the pump station operate independently.

The X-6619 STP utilizes aerobic digesters, aeration tanks, clarifiers, filters, and an activated sludge process to provide adequate sewage treatment. Following post-chlorination, dechromanation, and effluent monitoring, treated wastewater flows directly to the Scioto River through a pipeline. Dried digested sludge is containerized in 209-L (55-gal) drums and is stored as low-level waste on-site pending subsequent disposal at Envirocare in Utah.

3.9.2.5 Holding ponds and lagoons

Holding ponds and lagoons are used to control plant process effluent and storm water runoff. The ponds and lagoons also promote chlorine dissipation and settling of sediment mobilized by storm water runoff. Many also serve as spill retention basins to prevent off-site migration of spills or accidental discharges until treatment or recovery can be accomplished. Several ponds were designed specifically to treat process effluent. For example, the X-611B Sludge Lagoon is used for deposition of lime sludge generated from the drinking water purification process. Table 3.14 summarizes all the holding ponds on-site, their respective uses, and the surface water bodies into which they drain.

Table 3.14. PORTS holding ponds

Pond	Location (quadrant)	Purpose/use	Discharges to
X-230J5	West (III)	Control storm water runoff/sedimentation	Scioto River
X-230J6	Northeast (IV)	Control storm water runoff/sedimentation	Little Beaver Creek
X-230J7	Northeast (II)	Control storm water runoff/sedimentation	Little Beaver Creek
X-230K	Southeast (I)	Control storm water runoff/coal pile steam plant discharge	Big Run Creek
X-230L	North (IV)	Spill retention/control storm runoff/sedimentation	Little Beaver Creek
X-611A [a]	Northeast (IV)	Lime sludge lagoons (3), water treatment effluent	Little Beaver Creek
X-611B	Northeast (IV)	Lime sludge lagoon, water treatment effluent	Little Beaver Creek
X-701B [a]	Northeast (II)	Treatment of effluent	East Drainage Ditch
X-2230M	Southwest (I)	Control storm water runoff/sedimentation from GCEP	Scioto River
X-2230N	West (III)	Control sedimentation from GCEP construction	Scioto River

Source: DOE 1999b.
[a]Converted to a prairie habitat.
GCEP = Gas Centrifuge Enrichment Plant.

3.9.2.6 Telecommunications

PORTS currently has two Fujitsu-Omni 53 telephone switches with 2300 existing line connections. The site feed lines are copper cables capable of handling analog and digital signals through the Piketon, Ohio, exchange. Long distance service is through the Federal Telephone System. Commercial phone service is available. The site distribution system contains both copper and fiber-optic units.

3.10 NOISE

Noise at PORTS is intermittent and intensity levels vary. Noise levels associated with construction and processing activities and local traffic are comparable to those of any other industrial site. No sensitive receptor sites, such as picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, or hotels, are in the immediate vicinity of PORTS.

3.11 EXISTING RADIOLOGICAL AND CHEMICAL EXPOSURES

3.11.1 Public Radiation Dose

Potential impacts on human health from PORTS operations were calculated based on environmental monitoring and surveillance data. The effect of radionuclides released to the atmosphere was characterized by calculating effective dose equivalents (EDEs) to the maximally exposed person (a hypothetical individual who is assumed to reside at the most exposed point on the plant boundary) and to the entire population (approximately 918,000 residents) within 80.47 km (50 miles) of the plant. The maximum potential EDE to an off-site individual from DOE air emission sources at PORTS in 1999 was 0.00048 millirem (mrem)/year. USEC calculated the maximum potential dose to an off-site individual in 1999 to be 0.28 mrem/year. The combined dose from USEC and DOE sources is well below the 10 mrem/year NESHAP limit applicable to PORTS and the 300 mrem/year (approximate) dose that the average individual in the United States receives from natural sources of radiation. The collective EDE to the entire population within 80.5 km (50 miles) of PORTS in 1999 was 1.0 person-rem, based on USEC calculations of 1.0 person-rem/year from USEC sources and 0.00077 person-rem/year from DOE sources. The collective EDE to the nearest community, Piketon, was calculated to be 0.15 person-rem/year, based on USEC calculations of 0.15 person-rem/year from USEC sources and 0.00014 person-rem/year from DOE sources (DOE 2000a).

Based on a person driving past the PORTS depleted uranium cylinder storage yards to and from work for a year, the maximum estimated potential exposure to a member of the public from radiation from the cylinder yards is less than 0.59 mrem/year. The average yearly dose to a person in the United States from natural and man-made radiation sources is approximately 366 mrem. The potential estimated dose from the cylinder yards to a member of the public is less than 0.2% of the average yearly radiation exposure for a person in the United States.

3.11.2 Occupational Radiation Dose

The Radiation Exposure Information Reporting System report is an electronic file created annually to comply with DOE Order 5484.1. This report contains exposure results for all monitored individuals at PORTS, including visitors, with a positive exposure during the previous calendar year. The 2000 Radiation Exposure Information Reporting System report indicated that there were no visitors with a positive exposure. The average total effective dose in 2000 for all PORTS employees and subcontractors was 0.36 mrem (DOE 2000a).

3.11.3 Public Chemical Exposures

Direct exposure to chemicals from PORTS does not represent a likely pathway of exposure for the public. For airborne releases, concentrations off-site are too small to present problems through dermal exposure or inhalation pathways. Water discharge outfalls are located within areas of the site that are not readily accessible to the general public. Public exposure to water from the outfalls on a daily basis is highly unlikely, and ingestion of water directly from the outfalls is even less likely.

3.11.4 Occupational Chemical Exposure

Historically, PORTS operations involved the use of a variety of chemicals and toxic metal hazardous materials to which workers (potentially) have been exposed. These included solvents (e.g., TCE, carbon tetrachloride, methylene chloride, and benzene), toxic materials (e.g., arsenic, mercury, lithium, chromium, nickel, and beryllium), toxic gases [e.g., fluorine, hydrogen fluoride (HF), welding fumes, hydrogen cyanide, chlorine, chlorine trifluoride and its byproducts, and ammonia], acids (e.g., nitric acid and hydrochloric acid), and biocides and fungicides. Many of these materials have been greatly reduced or eliminated from routine operations, but workers involved in environmental restoration and waste management activities continue to face potential exposures.

The Hazardous Chemical Inventory Report, which includes the identity, location, storage information, and hazards of the chemicals that exceeded threshold planning quantities, is submitted annually to state and local authorities. Eleven materials stored by DOE-PORTS exceeded the threshold planning quantities in 1999: aluminum oxide, diesel fuel, ethylene glycol, lithium hydroxide, PCBs, sodium fluoride, sulfuric acid, triuranium octaoxide, UF_6, uranium tetrafluoride, and uranium (ingots and fuel rods) (DOE 2000a).

3.11.5 Occupational Health Services

Occupational health services for DOE and DOE's site management contractor employees have been arranged through a subcontract with the Southern Ohio Medical Center (SOMC), Portsmouth, Ohio. SOMC is a full-service community medical center, and its occupational health clinic offers comprehensive occupational health services, including chemical exposure screening. The SOMC occupational medical staff has some familiarity with PORTS operations from past contracts with the USEC Medical Department.

DOE's site management contractor and subcontractors are responsible for procuring their own medical services from SOMC. Some subcontractors have opted to retain the on-site medical services of the USEC Medical Department. DOE's site management contractor has mandated that the PORTS subcontractors adhere to the medical requirements in DOE Order 440.1A, Chapter 19, "Occupational Medicine," as listed in Exhibit G of their subcontracts.

3.12 ACCIDENTS

Potential accidents at PORTS are primarily associated with the approximately 13,900 DOE-managed cylinders containing depleted UF_6. The cylinders are stored in the X-745-C (C-yard) and X-745-E (E-yard) located in the northern part of PORTS just inside Perimeter Road.

The chemical and physical characteristics of depleted UF_6 pose potential health risks, and the material is handled accordingly. Uranium and its decay products in depleted UF_6 in storage emit low levels of alpha, beta, gamma, and neutron radiation. The radiation levels measured on the outside surface of filled depleted UF_6 cylinders are typically about 2 to 3 mrem/h, decreasing to about 1 mrem/h at a distance of 0.3 m (1 ft). If depleted UF_6 is released to the atmosphere, it reacts with water vapor in the air to form HF and a uranium oxyfluoride compound called uranyl fluoride. These products are chemically toxic. Uranium is a heavy metal that, in addition to being radioactive, can have toxic chemical effects (primarily on the kidneys) if it enters the bloodstream by means of ingestion or inhalation. HF is an extremely corrosive gas that can damage the lungs and cause death if inhaled at high enough concentrations.

Cylinders are stored with minimum risks to workers, members of the general public, and the environment at PORTS. DOE maintains an active cylinder management program to improve storage conditions in the cylinder yards, to monitor cylinder integrity by conducting routine inspections for breaches, and to perform cylinder maintenance and repairs to cylinders and the storage yards, as needed.

Potential accidents related to the PORTS cylinder yards have been analyzed in the Safety Analysis Report (SAR) for PORTS (LMES 1997). The SAR identified major hazards associated with confinement failures that could result in the release of UF_6—a release of solid or gaseous UF_6 to the atmosphere from cylinder failure and a cylinder yard fire. In the first case, a large spill of solid material was considered to bound all of the smaller releases that could occur. The conclusions of the SAR were that cylinder failure does not pose a severe health risk beyond approximately 200 m (656 ft). Because of the slow release rate, workers in the immediate area of the release could easily evacuate the area without being significantly exposed. On-site personnel are trained to flee areas where releases are detected by sight and/or odor (i.e., odor of HF at extremely low concentration levels is easily detectable). Beyond the 200 m (656 ft) and for the off-site public, both uranium intake and the HF exposure were estimated to be below the guideline threshold values of 10 mg uranium intake and 2.3 mg/m^3 HF exposure with no mitigation.

In the case of the cylinder yard fire, the event was not expected to occur during the life of the facility but was postulated as a worst-case scenario. The conclusions for the cylinder yard fire showed that the threshold values designed to protect public health of 30 mg uranium intake and 23.2 mg/m^3 HF exposure could be exceeded on-site out to about 275 m (900 ft) for the initial release if no mitigative actions were taken. Off-site boundaries are greater than 300 m (984 ft) from the cylinder yards. This scenario is estimated to have an extremely unlikely frequency. Primary controls to minimize the likelihood of a cylinder yard fire include preventative measures (e.g., inspection of cylinders before welding and the Fire Protection Program and its established controls). Although a cylinder yard fire case exceeds the guidelines for distances on-site, the combination of stringent controls to prevent a fire and a well-prepared emergency response plan limit the associated risk.

The disposition of the cylinders at PORTS has been addressed by DOE in the *Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride* (DOE/EIS-0269). The decision to construct and operate a cylinder conversion facility at PORTS will affect the probabilities and impacts of potential accidents.

4. ENVIRONMENTAL CONSEQUENCES

4.1 AIR QUALITY

4.1.1 X-600 Coal Fired Steam Plant

Expected air emissions would increase because additional steam generation capacity would be required. No evaluation of additional emissions estimates was performed for this alternative. It is anticipated that small increases in particulates, sulfur dioxide, and nitrous oxides would result (Tetra Tech 2000).

4.1.2 Electric Hot Water Boilers

No additional air emissions would result from the installation of electric hot water boilers.

4.1.3 New Hot Water Boiler System Supplied with Fuel Oil with the Potential for Conversion to Natural Gas and Electric Space Heaters and Vent Sealing in Process Buildings (Proposed Action)

The proposed action would require an additional air permit-to-install. The permit-to-install was submitted to the Ohio EPA for #2 fuel oil/natural gas fired boilers. Two boiler systems were evaluated which are designed to operate both on natural gas and #2 fuel oil. The boilers would operate on fuel oil initially, with conversion to natural gas by early Fiscal Year (FY) 2002. The boilers would have a flanged flue exhaust vent at the top front of the boiler. The boilers would have individual connections for exhaust stacks suitable for the boilers to which they would be attached. The stacks would project approximately 100 ft above the boilers. No ongoing stack emissions monitoring would be required. In accordance with the General Conformity Rule, this action would conform to the Ohio State Implementation Plan for air emission sources (Tetra Tech 2000).

Emission estimates for the two boiler systems evaluated were at or below emission limits listed in the Air Permit Application that was submitted to the Ohio EPA. Boiler System 2 is the preferred boiler system for the proposed action. The proposed action would require only one new air emissions source for the new stacks associated with the oil/gas fired boilers. Potential emissions would not be expected to exceed current emissions from ongoing operations, result in a noncompliance of air quality standards, have an adverse impact on air quality, or be detrimental to human health. Potential air emissions information is summarized in Table 4.1 (Tetra Tech 2000).

Table 4.1. Potential air emissions for boilers fired with #2 fuel oil and natural gas

Types of Emissions	Boiler System 1		Boiler System 2		Emission Limits in Air Permit Application	
	Natural Gas (lb/10^6 Btu)	#2 Oil (lb/10^6 Btu)	Natural Gas (lb/10^6 Btu)	#2 Oil (lb/10^6 Btu)	Natural Gas (lb/10^6 Btu)	#2 Oil (lb/10^6 Btu)
Stack CO emissions	0.075	0.040	0.07	0.04	N/A*	0.04
Stack Particulate emissions	0.020	0.014	0.001	0.005	N/A	0.014
Stack NOx emissions	0.036	0.125	0.035	0.20	N/A	0.20
Stack Hydrocarbon emissions	0.005	0.005	0.004	0.01	N/A	0.01

* Permit currently only includes provisions for use of #2 fuel oil as fuel. Permit will be modified to include use of natural gas as fuel at a later date when natural gas becomes available.

Construction of the pipeline could cause a temporary reduction in local ambient air quality as a result of fugitive dust and emissions generated by construction equipment. The extent of dust generation would depend on the level of construction activity and on soil composition and dryness. If proper dust suppression techniques were not employed, dry and windy weather could create a nuisance for nearby residents. The emissions from construction vehicles and equipment should have little impact on the air quality of the region; however, under certain weather conditions, there might be high concentration of pollutants in the vicinity of the pipeline construction area.

4.1.4 No Action

No additional air emissions would result from the no-action alternative. Airborne emissions from ongoing uranium enrichment operations are scheduled to continue until June 2001. Some ongoing air emissions would continue from USEC transfer and shipping operations, and emissions from placing the GDP in cold standby should decrease, but may continue if DOE elects to perform cell treatments to remove deposits. Under the no-action alternative, environmental restoration and D&D activities also would continue. Air quality effects from ongoing operations and remedial actions are relatively small, and the radiological dose via the air pathway is well below applicable limits. Current emissions are discussed in Sect. 3.2.2.

4.2 GEOLOGY AND SOILS

4.2.1 X-600 Coal Fired Steam Plant

Minor excavation would be required in previously disturbed areas in order to resize pipelines and accomplish necessary reconfigurations. Impacts to geology and soils would be negligible.

4.2.2 Electric Hot Water Boilers

No excavation or disturbance of soils would be required; therefore, there would be no impact to geology and soils.

4.2.3 New Hot Water Boiler System Supplied with Fuel Oil with the Potential for Conversion to Natural Gas and Electric Space Heaters and Vent Sealing in Process Buildings (Proposed Action)

Minimal site grading and contouring may be required in the area of Building X-3002 for the installation of the #2 fuel oil tanks and access road. In addition, installation of the natural gas line would require excavation of an approximate 18-in wide trench up to 4-ft deep; however, the geologic formations underlying these areas would not be affected by the proposed action.

The Soil Survey of Pike County, Ohio, indicates that soil types that occur within the proposed pipeline route and PORTS property boundary are considered prime farmland. The Farmland Protection Policy Act requires federal agencies to consider the effects of any activity that would convert farmland. Although the proposed action would require installation of a natural gas line in some areas that are currently cultivated, the depth of the pipeline installation would not interfere with further agricultural activities. The excavated surfaces will be returned to their original condition subsequent to pipeline installation.

4.2.4 No Action

Under the no-action alternative, the PORTS site could expect major impacts to soils and subsurface geology. The freezing of fire protection water supply lines and the discharge of this water to soils, surface water, and groundwater could result in contamination, currently controlled within site structures, being released to the environment. Although monitoring and appropriate environmental restoration measures would be continued and appropriate mitigation measures would remain in place, releases could occur. Fire Protection Systems could be disabled to prevent flooding of the facilities; however, fire code violations would occur as a result of this action. Impacts to soils and subsurface geology could also occur as the result of a spill or leak from ongoing operations.

4.3 WATER RESOURCES

4.3.1 Reasonable Alternatives Evaluated

For the three reasonable alternatives evaluated, uncontrolled soil erosion would increase sedimentation and turbidity in the receiving surface waters. Spills of fuel, hazardous material, waste, or a sewer line leak could have adverse impacts on surface waters if not controlled or contained. Impacts would primarily be a change to the water quality (pH, dissolved oxygen, conductivity, etc.) which could affect vegetation and aquatic biota. Soil erosion impacts would be mitigated through the use of best management practices (BMPs) (i.e., silt fences, straw bales, and temporary sediment detention basins). The potential for spills would be mitigated through the adherence to proper safety procedures and spill prevention plans. In the event of a spill from an accident, spill response measures (e.g., booms, berms, sorbents, neutralizers, secondary containment, and mechanical removal equipment) would minimize potential adverse impacts.

Coordination with DOE and their site management contractor's Environment, Safety, and Health organization also would be required prior to any earth-disturbing activities, changes in discharges to the storm drain system, outdoor application of herbicides and pesticides, or facility modifications.

Impacts to groundwater quality could also occur as a result of a fuel, waste spill, or a sewer line leak and subsequent migration of contaminants through the soil profile to the groundwater table. A spill directly into the surface water bodies in the vicinity also could affect the groundwater quality because of the connection between surface water and groundwater resources. The use of safety procedures, spill prevention plans, and spill response plans in accordance with state and federal laws would minimize the severity of potential impacts from accidents.

4.3.1.1 X-600 Coal Fired Steam Plant

The greatest potential impact to surface waters would originate from soil erosion, runoff, and sedimentation during modification of the steam plant heat exchangers and RHW lines. In addition, a fuel, hazardous material, waste spill, or a sewer line leak could occur.

4.3.1.2 Electric Hot Water Boilers

The greatest potential impact to surface waters would originate from soil erosion, runoff, and sedimentation during modification of the heat exchangers and RHW lines. In addition, a fuel, hazardous material, waste spill, or a sewer line leak could occur.

4.3.1.3 New Hot Water Boiler System Supplied with Fuel Oil with the Potential for Conversion to Natural Gas and Electric Space Heaters and Vent Sealing in Process Buildings (Proposed Action)

The greatest potential impact to surface waters would originate from soil erosion, runoff, and sedimentation (during building modification and pipeline installation). In addition, a fuel, hazardous material, waste spill, or a sewer line leak could occur during building modification, pipeline installation, or operation of the proposed hot water boiler system.

4.3.2 No Action

Under the no-action alternative, the PORTS site could expect major impacts to surface water and groundwater. The freezing of fire protection water supply lines and the discharge of this water to soils, surface water, and groundwater could result in contamination, currently controlled within these structures, being released to the environment. Although monitoring and appropriate environmental restoration measures would be continued and appropriate mitigation measures would remain in place, releases could occur. Impacts to surface water or groundwater could also occur as the result of a spill or leak from ongoing operations. Surface and groundwater protection measures, such as spill prevention and spill response plans, are already in place at PORTS for ongoing operations.

4.4 FLOODPLAINS AND WETLANDS

4.4.1 X-600 Coal Fired Steam Plant

Modifications of the X-600 Coal Fired Steam Plant, RHW lines, and heat exchanges would result in no direct impacts to floodplains or wetlands; however, potential releases associated with these activities could result in contamination of wetlands, area streams, and floodplains.

4.4.2 Electric Hot Water Boilers

Installation of electric hot water boilers, heat exchangers, and modification of RHW lines would result in no direct impacts to floodplains or wetlands; however, potential releases associated with these activities could result in contamination of wetlands, area streams, and floodplains.

4.4.3 New Hot Water Boiler System Supplied with Fuel Oil with the Potential for Conversion to Natural Gas and Electric Space Heaters and Vent Sealing in Process Buildings (Proposed Action)

The 6-in steel natural gas pipeline would be installed by digging a trench approximately 3-4 ft deep x 18-in wide and placing the pipe within the trench. The trench would be backfilled, reseeded, and strawed. Crossings of paved roads would be accomplished by boring under the road. Directional boring would also be used to go under any blue-line streams and delineated wetlands or other sensitive areas encountered along the route. There would be no disturbance of sediment or sensitive habitats. Soils resulting from the bores would be redistributed on the ground surface at the bore sites but not directly in sensitive areas. The construction contractor would coordinate boring activities with the USACE. Floodplains would not be impacted by the installation.

No other impacts to floodplains or wetlands are expected as a result of the proposed action.

4.4.4 No Action

Under the no-action alternative, the PORTS site could expect major impacts to surface water and groundwater. Consequently, impacts to floodplains and wetlands could result from transport of contaminants through surface water and groundwater to these sensitive areas. The freezing of fire protection water supply lines and the discharge of this water to soils, surface water, and groundwater could result in contamination, currently controlled within these structures, being released to the environment. Although monitoring and appropriate environmental restoration measures would be continued and appropriate mitigation measures would remain in place, releases could occur.

4.5 ECOLOGICAL RESOURCES

4.5.1 X-600 Coal Fired Steam Plant

Activities associated with modification of the X-600 Coal Fired Steam Plant would have no direct impact on terrestrial habitats, plants, and animals present within PORTS. Since there are no construction activities associated with this alternative that are outside disturbed areas, no adverse impacts to terrestrial and aquatic ecosystems would be expected. If impacts to ecological resources at PORTS are encountered, they would be addressed by avoiding the resource, minimizing the impact, or mitigating the impact if avoidance or minimization is not possible.

No direct or indirect impacts would occur to any threatened and endangered species from completion of this alternative. No federally listed threatened and endangered plants or animals are known to exist within the boundary of PORTS. Carolina yellow-eyed grass (state-listed endangered) and Virginia meadow-beauty (state-listed potentially threatened) occur within Quadrant IV but these areas would not be affected by this alternative. The USFWS has indicated that the Indiana bat is the only federally listed endangered animal species whose home range includes PORTS, although no Indiana bats have ever been captured or observed at the site. The USFWS has recommended that if potential roost trees with exfoliating bark are encountered in any area proposed for development, they and surrounding trees should be saved wherever possible. If such trees are within the area and they require removal, they should not be cut between April 15 and September 15. If potential maternity roost trees are present, and if the above time restriction is unacceptable, mist net or other surveys should be conducted to determine if Indiana bats are present. If needed, the surveys should be conducted in June or July to coincide with the peak summer bat population. If direct impacts to potential Indiana bat habitat could not be avoided, DOE would implement the USFWS recommendations.

4.5.2 Electric Hot Water Boilers

Activities associated with installation of electric hot water boilers would have no direct impact on terrestrial habitats, plants, and animals present within PORTS. Since there are no construction activities associated with this alternative that are outside disturbed areas, no adverse impacts to terrestrial and aquatic ecosystems would be expected. If impacts to ecological resources at PORTS are encountered, they would be addressed by avoiding the resource, minimizing the impact, or mitigating the impact if avoidance or minimization is not possible.

No direct or indirect impacts would occur to any threatened and endangered species from completion of the proposed action. No federally listed threatened and endangered plants or animals are known to exist within the boundary of PORTS. Carolina yellow-eyed grass (state-listed endangered) and Virginia meadow-beauty (state-listed potentially threatened) occur within Quadrant IV but these areas would not be affected by this alternative. The USFWS has indicated that the Indiana bat is the only federally listed endangered animal species whose home range includes PORTS, although no Indiana bats have ever been captured or observed at the site. The USFWS has recommended that if potential roost trees with exfoliating bark are encountered in any area proposed for development, they and surrounding trees should be saved wherever possible. If such trees are within the area and they require removal, they should not be cut between April 15 and September 15. If potential maternity roost trees are present, and if the above time restriction is unacceptable, mist net or other surveys should be conducted to determine if Indiana bats are present. If needed, the surveys should be conducted in June or July to coincide with the peak summer bat population. If direct impacts to potential Indiana bat habitat could not be avoided, DOE would implement the USFWS recommendations.

4.5.3 New Hot Water Boiler System Supplied with Fuel Oil with the Potential for Conversion to Natural Gas and Electric Space Heaters and Vent Sealing in Process Buildings (Proposed Action)

Activities associated with modification of Building X-3002 would have no direct impact on terrestrial habitats, plants, and animals present within PORTS. Installation of the natural gas pipeline could have potential adverse impacts to aquatic resources, terrestrial habitats, plants, and animals within the affected area. Mitigation measures under this proposed action would minimize impacts. This would be accomplished by avoiding sensitive habitats, relocation of the pipeline, as necessary, and restricting installation to existing right-of-ways (ROWs) to the greatest extent possible.

Potential adverse impacts to terrestrial and aquatic ecosystems would be minor and the systems would recover through natural processes. Local terrestrial and aquatic fauna would temporarily relocate to adjacent areas and would repopulate these areas upon completion of construction activities. No permanent damage to these ecosystems would be expected.

Impacts to ecological resources at PORTS would be addressed by avoiding the resource, minimizing the impact, or mitigating the impact if avoidance or minimization is not possible. Impacts from installation of the pipeline would be considered short term and minimal.

No direct or indirect impacts would occur to any threatened and endangered species from completion of the proposed action. No federally listed threatened and endangered plants or animals are known to exist within the boundary of PORTS. Carolina yellow-eyed grass (state-listed endangered) and Virginia meadow-beauty (state-listed potentially threatened) occur within Quadrant IV but these areas would not be affected by the proposed action. The USFWS has indicated that the Indiana bat is the only federally listed endangered animal species whose home range includes PORTS, although no Indiana bats have ever been captured or observed at the site. The USFWS has recommended that if potential roost trees with exfoliating bark are encountered in any area proposed for development, they and surrounding trees should be saved wherever possible. If such trees are within the area and they require removal, they should not be cut between April 15 and September 15. If potential maternity roost trees are present, and if the above time restriction is unacceptable, mist net or other surveys should be conducted to determine if Indiana bats are present. If needed, the surveys should be conducted in June or July to coincide with the peak summer bat population. If direct impacts to potential Indiana bat habitat could not be avoided, DOE would implement the USFWS recommendations.

4.5.4 No Action

Environmental restoration activities under the no-action alternative could potentially impact ecological resources at PORTS, but the areas where these activities would most likely take place have been previously disturbed and contain marginal habitat and limited biota. Environmental restoration activities are evaluated under the RCRA corrective action process. If remedial actions were determined to impact ecological resources, the potential impacts and any mitigation measures would also be considered as part of the RCRA corrective action process. The potential also exists for a spill or leak from normal ongoing operations and traffic at the site. Impacts to biota could include direct mortality, injury, and degradation of the impacted habitat. Because of the limited habitat and biota at the site, these impacts would probably be minor to moderate and the resource would be expected to recover within a few months to a year depending on the severity of the spill or leak. Spills and releases to soils, surface water, and groundwater would be expected as a result of the no-action alternative. These potential spills and releases could impact the limited biota at the site.

4.6 CULTURAL RESOURCES

4.6.1 X-600 Coal Fired Steam Plant

No discussions have been initiated with the Ohio SHPO concerning this alternative; therefore, it is unknown if an adverse effect to historical properties would result from selection of this alternative. However, the impacts should be similar to those expected from the proposed action.

4.6.2 Electric Hot Water Boilers

No discussions have been initiated with the Ohio SHPO concerning this alternative; therefore, it is unknown if an adverse effect to historical properties would result from selection of this alternative. However, the impacts should be similar to those expected from the proposed action.

4.6.3 New Hot Water Boiler System Supplied with Fuel Oil with the Potential for Conversion to Natural Gas and Electric Space Heaters and Vent Sealing in Process Buildings (Proposed Action)

Notifications of the proposed building modification and pipeline installation have been provided to the Ohio SHPO (copies are included in Appendix B). DOE PORTS provided a determination that there would be no adverse effects on historical resources included or eligible for inclusion in the NRHP. In addition to the NHPA, cultural resources on federal lands are also protected under the Archaeological Resources Protection Act of 1979, as amended, and the Native American Graves Protection and Repatriation Act of 1990. An archaeological survey would be performed prior to installation of the natural gas line. If an unanticipated discovery of cultural materials (e.g., human remains, pottery, bottles, weapon projectiles, and tools) or sites was made during development activities, all ground-disturbing activities in the vicinity of the discovery would be halted immediately. The DOE-ORO Cultural Resources Management Coordinator would be contacted, and consultation with the Ohio SHPO would be initiated and completed prior to any further disturbance of the discovery-site area.

4.6.4 No Action

No discussions with the Ohio SHPO concerning this alternative have been initiated; however, degradation of buildings that have been tentatively identified as contributing to the PORTS historic property would be expected if no action were taken.

4.7 SOCIOECONOMICS

4.7.1 X-600 Coal Fired Steam Plant

The potential socioeconomic impacts of the X-600 Coal Fired Steam Plant alternative for PORTS winterization activities including demographics, employment, income, housing, public services, local government expenditures, and fiscal characteristics would be minimal. A slight increase in coal consumption could be anticipated which would result in a slight increase in truck traffic.

4.7.2 Electric Hot Water Boilers

The potential socioeconomic impacts of the electric hot water boilers alternative for PORTS winterization activities including demographics, employment, income, housing, public services, local government expenditures, and fiscal characteristics would be minimal.

4.7.3 New Hot Water Boiler System Supplied with Fuel Oil with the Potential for Conversion to Natural Gas and Electric Space Heaters and Vent Sealing in Process Buildings (Proposed Action)

This section assesses the potential socioeconomic impacts of the proposed action for PORTS winterization activities including demographics, employment, income, housing, public services, local government expenditures, and fiscal characteristics. Modifications to Building X-3002 would have minor impact on transportation; no other socioeconomic impacts would result from this action.

Installation of the natural gas pipeline would result in temporary impacts to some properties along the course of the pipeline installation. These impacts would involve property disturbance during pipeline installation and associated nuisance related to construction activities. These impacts would be temporary and would be eliminated once construction activities are complete. In addition, the pipeline would be within 750 ft of Piketon Jr. High School.

4.7.4 No Action

No socioeconomic impacts are associated with the no-action alternative.

4.8 INFRASTRUCTURE AND SUPPORT SERVICES

4.8.1 Transportation

4.8.1.1 X-600 Coal Fired Steam Plant

Under this alternative, a slight increase in coal consumption could be anticipated which would result in a minor increase in truck traffic. The number of vehicle trips to and from the site would probably be equal to or slightly greater than the current amount of traffic. Impacts to transportation in the area would not require modification of roads or other infrastructure to accommodate additional traffic.

4.8.1.2 Electric Hot Water Boilers

No transportation impacts are associated with the electric hot water boiler alternative. With the reduction in power consumption resulting from placing PORTS in a cold standby mode, excess electricity is available and no alterations to power transmission infrastructure would be required.

4.8.1.3 New Hot Water Boiler System Supplied with Fuel Oil with the Potential for Conversion to Natural Gas and Electric Space Heaters and Vent Sealing in Process Buildings (Proposed Action)

Transportation impacts associated with modification of Building X-3002 would be minimal. These impacts would result from an increase in fuel-oil tanker trucks on U.S. Route 23 and/or U.S Route 32 especially during the initial filling of the fuel oil tanks; routine delivery of fuel oil would be limited to approximately 5 fuel-oil tanker trucks per day. These minor transportation impacts would be further reduced upon completion of the natural gas pipeline. Impacts to transportation in the area would not require modification of roads or other infrastructure to accommodate additional traffic.

In addition, the proposed action would require installation of the natural gas pipeline under Market Street, Beaver Creek Road, U.S. Route 32, Schuster Road, CSX Railroad Line, McCorkle Road, East Access Road, and Perimeter Road. The impacts to traffic on these roadways would be minimal. In the case of roadways under local government jurisdiction (county and city roads) there would be minimal interruption of traffic during pipeline construction; alternate routes are readily available for detour of traffic, if required. No impact to railways and roadways under federal jurisdiction (U.S. highways) would occur because these transportation routes would be crossed using the same directional drilling techniques utilized to install the pipeline under streams.

4.8.1.4 No Action

No transportation impacts are associated with the no-action alternative.

4.8.2 Utilities

4.8.2.1 X-600 Coal Fired Steam Plant

The potential utilities impacts of the X-600 Coal Fired Steam Plant alternative for PORTS winterization activities would be minimal. A slight increase in steam plant capabilities would be necessary and an additional temporary boiler system may be required. No additional impacts to utilities would be anticipated.

4.8.2.2 Electric Hot Water Boilers

The potential utilities impacts of the electric hot water boilers alternative for PORTS winterization activities would be minimal. Since the PORTS site is being placed in cold standby, electric power is readily available and electric power consumption would be substantially less than current power consumption at the site. Numerous modifications to power distribution systems within buildings would be required and would be costly.

4.8.2.3 New Hot Water Boiler System Supplied with Fuel Oil with the Potential for Conversion to Natural Gas and Electric Space Heaters and Vent Sealing in Process Buildings (Proposed Action)

The potential utilities impact of the proposed action would result in two additional fuel sources being available on plant site. Installation of the natural gas pipeline would supply an additional fuel source at the site that is currently not available. Natural gas is a clean, safe, and economical source of fuel. The fuel oil supply system would provide a fuel source in the event electrical supplies and natural gas supplies were interrupted. Both of these fuel sources provide more environmentally sound heating capabilities than could be provided by upgrades to the existing steam plant and corresponding increases in coal consumption and would result in less air emissions.

4.8.2.4 No Action

No utilities impacts are associated with the no-action alternative.

4.9 NOISE

4.9.1 X-600 Coal Fired Steam Plant

The minor modifications of RHW line and heat exchangers that would be required to implement this alternative would result in minor, temporary increases in noise levels at the site. Noise would return to current levels after completion of construction activities.

4.9.2 Electric Hot Water Boilers

The minor modifications of RHW line and heat exchangers that would be required to implement this alternative would result in minor, temporary increases in noise levels at the site. Noise would return to current levels after completion of construction activities.

4.9.3 New Hot Water Boiler System Supplied with Fuel Oil with the Potential for Conversion to Natural Gas and Electric Space Heaters and Vent Sealing in Process Buildings (Proposed Action)

The modifications of Building X-3002 RHW lines and installation of the natural gas pipeline would result in minor, temporary increases in noise levels at the site. Noise would return to current levels after completion of construction activities.

Noise levels along the pipeline route could increase during construction activities. Impact on the local noise environment would occur during construction of the proposed pipeline. Construction would proceed progressively down the ROW in the open-trench phase of construction, which should be of short duration. Construction equipment would be operated on a random, as-needed basis during this period. Consequently, although individuals in the immediate vicinity of the work could experience temporary annoyance, the duration of the impact on the noise environment would be minimal.

4.9.4 No Action

No additional noise impacts are associated with the no-action alternative.

4.10 HUMAN HEALTH AND SAFETY

No unique occupational health and safety hazards would be posed by any of the alternatives considered, including the proposed action. Falls, spills, vehicle accidents, confined-space incidents, and injuries from tool and machinery operation could occur. Similar hazards also would be present during construction activities. Workers would be expected to receive applicable training, be protected through appropriate controls and oversight, and follow standard industrial and protective engineering practices, including the use of personal protective clothing and equipment as specified in applicable Occupational Safety and Health Act of 1970 (OSHA) regulations (e.g., 29 *CFR* 1910 and 29 *CFR* 1926).

On-site occupational radiological exposures for subcontractors implementing any modifications discussed in this EA would be similar to the doses estimated for on-site workers and would be kept below the 5000 mrem/yr limit for occupational exposure of radiation workers set by the NRC and DOE. However, DOE has established an administrative control limit of 2000 mrem/yr. BJC has adopted DOE's administrative control limit guidance as their policy. To further reduce exposures, each BJC project establishes an even lower administrative control level. PORTS follows the principles of As Low As Reasonably Achievable to further limit doses to the workers as much as possible. No unique chemical exposures would be anticipated from construction activities. Potential chemical exposures for on-site workers could include various hazardous materials and chemicals such as solvents, ketones, toluene, methanol, xylenes, formaldehyde, phenols, acids, ammonia, metals, and silicates. All activities involving chemicals would be expected to comply with applicable OSHA regulations including environmental exposure standards, applicable training requirements, hazard communication programs, engineering controls, and the use of personal protective clothing and equipment. DOE has taken responsibility for the health and safety oversight on federal property with radiological restrictions.

Activities at PORTS conducted by DOE that could impact the public are subject to DOE Orders 5400.1, *General Environmental Protection*, and 5400.5, *Radiation Protection of the Public and the Environment*. Current chemical and radiological exposures would likely continue at low levels as they currently exist.

Occupational exposures for DOE and contractor workers follow the requirements of DOE Order 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees*, and 10 *CFR* 835, *Occupational Radiation Protection*. The NRC performs regulatory oversight of USEC activities. OSHA regulates USEC occupational safety and worker health, and the State of Ohio and the U.S. EPA regulate USEC environmental activities.

4.10.1 X-600 Coal Fired Steam Plant

No additional health and safety impacts are associated with the X-600 Fired Steam Plant alternative.

4.10.2 Electric Hot Water Boilers

No additional health and safety impacts are associated with the electric hot water boilers alternative.

4.10.3 New Hot Water Boiler System Supplied with Fuel Oil with the Potential for Conversion to Natural Gas and Electric Space Heaters and Vent Sealing in Process Buildings (Proposed Action)

The proposed pipeline would be designed, constructed, operated, and maintained in accordance with the U.S. Department of Transportation (DOT) Minimum Federal Safety Standards in 49 CFR Part 192. The regulations are intended to ensure adequate protection for the public from natural gas pipeline failures. Part 192 specifies material selection and qualification, minimum design requirements, and protection from internal, external, and atmospheric corrosion.

Part 192.5 defines area classifications, based on population density in the vicinity of the pipeline, which determine more rigorous safety requirements for populated areas. The class location unit is an area that extends 220 yards on either side of the centerline of any continuous 1-mi length of pipeline. The four area classifications are defined as follows:

- Class 1 – Location with 10 or fewer buildings intended for human occupancy.
- Class 2 – Location with more than 10 but less than 46 buildings intended for human occupancy.
- Class 3 – Location with 46 or more buildings intended for human occupancy or where pipeline lies within 100 yards of any building, or small, well-defined outside area occupied by 20 or more people during normal use.
- Class 4 – Location where buildings with four or more stories aboveground are prevalent.

Class locations representing more populated areas require higher safety factors in pipeline design, testing, and operation. Pipelines constructed in Class 1 locations must be installed with a minimum depth of cover of 30 in. in normal soil and 18 in. in consolidated rock. Class 2, 3, and 4 locations, as well as drainage ditches of public roads and railroad crossings, require 36 in. in normal soil and 24 in. in consolidated rock. Class locations also specify the maximum distance to a sectionalizing block valve—10-mi in Class 1, 7.5-mi in Class 2, 4-mi in Class 3, and 2.5-mi in Class 4. Pipeline design pressures, hydrostatic test pressures, maximum allowable operating pressure, inspection and testing of welds, and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas. The area classification for the proposed action would be Class 3.

4.10.4 No Action

No additional health and safety impacts are associated with the no-action alternative.

4.11 ACCIDENTS

Under any of the alternatives evaluated, accidents could occur during construction activities or operation of a new or existing facility. Accidents could result from operator error, equipment malfunction, or from natural phenomena (e.g., earthquakes, tornadoes, flooding, fire, etc.). Typical accidents that could result from construction activities include falls, chemical spills, vehicle accidents, confined-space incidents, and injuries from tool and machinery operation. Potential hazards from the operation of facilities could include radiation sources, toxic/corrosive/reactive materials, flammable materials, and electrical energy. Other hazards include kinetic energy and stored energy. Examples of kinetic energy hazards include moving ventilation system components, forklifts, and other drum- or box-handling equipment. Stored energy hazards include elevated structures and equipment, stacked drums, and boxes. Consequences of these hazards could potentially include:

- internal and external radiation exposure to on-site and off-site personnel;
- exposure of on-site and off-site personnel to toxic chemicals;
- building fire resulting in the release of toxic and radioactive materials and the production of toxic gases, smoke, and/or corrosive materials;
- electrical burns, shock, and electrocution; and
- bruises, broken bones, cuts, etc.

An example of a typical accident that could potentially occur during the operation of an existing or new facility would be a building fire. The consequences of a potential fire would depend on several factors, including building construction materials and design and the types and quantities of materials used and stored within the building. Although most fires start as small, localized fires, the amounts of flammable materials and combustibles available in the facility could make a fire grow in intensity. There is the potential that a fire could spread and involve a major portion of the building, but with the proper mitigation measures in place, it is most likely that the fire would remain localized, affecting only the area where the fire was initiated.

A toxic material release could potentially occur inside a building as the result of a fire or explosion. Although the majority of the toxic material release concerns would be localized, the potential would exist for toxic gases or aerosols to be drawn into the building ventilation system and be distributed throughout other sections of the building. If the event were large enough, these gases or aerosols could be released to the outside.

The potential for fires and any resulting adverse impacts would likely be mitigated by the following: building modification materials would comply with all applicable National Fire Protection Association codes and standards; buildings would be equipped with fire detection systems and fire suppression equipment as applicable (e.g., fire alarms, portable fire extinguishers, and sprinkler systems); and appropriate fire safety and emergency policies and procedures, including proper training, would be implemented. Emergency response would be provided by the on-site Fire Services and through mutual-aid agreements with the surrounding fire departments and emergency response organizations.

Accidental spills of hazardous materials during construction activities or facility operations could cause contamination of localized areas of soil and subsequent impacts on surface waters and groundwater. Terrestrial and aquatic plants and animals in the affected areas could also be adversely impacted. Accidental releases of high concentration and/or large quantities of hazardous materials could cause water quality standards to be exceeded and result in fish kills. Impacts from accidental spills and releases would be addressed by individual operating entities through the use of safety procedures and spill prevention and response plans.

The Emergency Planning and Community Right-To-Know Act of 1986, also referred to as the Superfund Amendments and Reauthorization Act Title III, requires reporting of emergency planning information, hazardous chemical inventories, and releases to the environment. Section 304 of the Emergency Planning and Community Right-To-Know Act requires reporting of off-site reportable quantity releases to state and local authorities. Accident scenarios and consequences from ongoing operations are addressed in the SAR for PORTS (LMES 1997).

4.11.1 X-600 Coal Fired Steam Plant

Transportation accidents under the X-600 Coal Fired Steam Plant alternative would be expected to be similar to those that could potentially occur during normal operations at PORTS and would depend on the types and amounts of traffic entering and exiting the roads and highways in and around the site. The most common type of transportation accident that would be expected to occur would be vehicular accidents involving site workers or visitors. No additional accident impacts are associated with the X-600 Coal Fired Steam Plant alternative.

4.11.2 Electric Hot Water Boilers

No additional accident impacts are associated with the electric hot water boilers alternative.

4.11.3 New Hot Water Boiler System Supplied with Fuel Oil with the Potential for Conversion to Natural Gas and Electric Space Heaters and Vent Sealing in Process Buildings (Proposed Action)

Transportation accidents under the proposed action would be expected to be similar to those that could potentially occur during normal operations at PORTS and would depend on the types and amounts of traffic entering and exiting the roads and highways in and around the site. The most common type of transportation accident that would be expected to occur would be vehicular accidents involving site workers or visitors.

Under the proposed action, regular fuel oil deliveries would be expected. There is the potential for accidents involving the spill or leakage of fuel oil. However, it is expected that the quantities of this material would be transported in the proper containers and according to all applicable regulations. The use of safety procedures, spill prevention plans, and spill response plans in accordance with state and federal laws would minimize the severity of potential impacts from transportation accidents.

In addition to transportation of fuel oil, accidents related to natural gas pipeline installation and operation could be anticipated. The most common types of accidents associated with natural gas pipelines would result from accidental excavation of pipelines and ignition of gas or from a failure of the pipeline resulting in release of gas into structures occupied by humans. The minimum standards for operating and maintaining pipeline facilities, including the requirement to establish a written plan governing these activities, are specified in 49 CFR Part 192. Under Section 192.615, each pipeline operator must also establish an Emergency Plan, which provides written procedures to minimize the hazards from a gas pipeline emergency. Key elements of the plan include procedures for

- receiving, identifying, and classifying emergency events—gas leakage, fires, explosions, and natural disasters;
- establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response;
- making personnel, equipment, tools, and materials available at the scene of an emergency;
- protecting people first and then property, and making safe from actual or potential hazards; and
- emergency shutdown of system and safely restoring service.

Each operator must establish and maintain liaison with appropriate fire, police, and public officials to learn the resources and responsibilities of each organization that may respond to a gas pipeline emergency and coordinate mutual assistance in responding to emergencies. The operator must also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials (DOE 1989).

4.11.4 No Action

NCS problems could result from the uncontrolled release of water from fire protection systems caused by freezing of sprinkler system lines in areas where UF_6 is present at various levels of enrichment.

4.12 WASTE MANAGEMENT AND WASTE MINIMIZATION

It is anticipated that only minor quantities of solid waste and construction debris would be generated as part of any of the alternatives evaluated. Waste generation and handling, including any pollution prevention and waste minimization practices, would be accomplished in accordance with established procedures and regulations.

4.12.1 X-600 Coal Fired Steam Plant

Excavation of soils required to modify RHW supply lines and accomplish installation of exchangers that would be accomplished in the upper 10 ft of soil would be returned to the excavated area. Because the PORTS correction actions program is managed in accordance with RCRA regulations and because groundwater has been designated as containing listed hazardous waste, any soils generated from excavations greater than 10 ft in depth would require further analysis and handling as hazardous waste, whereas excavations less than 10 ft can be returned to the excavated area and do not require handling as hazardous wastes. This agreement was reached with regulatory agencies in order to allow routine maintenance and repair of underground appurtenances without generation of large volumes of soil that would require management as hazardous waste. No additional waste management and waste minimization impacts are associated with the X-600 Coal Fired Steam Plant alternative.

4.12.2 Electric Hot Water Boilers

Excavation of soils required to modify RHW supply lines and accomplish installation of exchangers that would be accomplished in the upper 10 ft of soil would be returned to the excavated area. Because the PORTS correction actions program is managed in accordance with RCRA regulations and because groundwater has been designated as containing listed hazardous waste, any soils generated from excavations greater than 10 ft in depth would require further analysis and handling as hazardous waste, whereas excavations less than 10 ft can be returned to the excavated area and do not require handling as hazardous wastes. This agreement was reached with regulatory agencies in order to allow routine maintenance and repair of underground appurtenances without generation of large volumes of soil that would require management as hazardous waste. No additional waste management and waste minimization impacts are associated with the electric hot water boiler alternative.

4.12.3 New Hot Water Boiler System Supplied with Fuel Oil with the Potential for Conversion to Natural Gas and Electric Space Heaters and Vent Sealing in Process Buildings (Proposed Action)

Excavation of soils required to modify RHW supply lines and install the natural gas pipeline that would be accomplished in the upper 10 ft of soil would be returned to the excavated area. Because the PORTS correction actions program is managed in accordance with RCRA regulations and because groundwater has been designated as containing listed hazardous waste, any soils generated from excavations greater than 10 ft in depth would require further analysis and handling as hazardous waste, whereas excavations less than 10 ft can be returned to the excavated area and do not require handling as hazardous wastes. This agreement was reached with regulatory agencies in order to allow routine maintenance and repair of underground appurtenances without generation of large volumes of soil that would require management as hazardous waste. No additional waste management and waste minimization impacts are associated with the proposed action.

4.12.4 No Action

If no action was taken, freezing of facilities and systems during periods of cold weather would likely have the following waste management and waste minimization impacts:

- substantial and costly damage from freezing of fire protection systems,
- potential RCRA waste storage noncompliances,
- the potential for generating contaminated water or other materials requiring cleanup, processing, storage and/or disposal; and
- potential impact on surrounding environment (soils, streams, groundwater, etc.).

4.13 CUMULATIVE IMPACTS

Cumulative impacts are those that may result from the incremental impacts of an action considered additively with the impacts of other past, present, and reasonably foreseeable future actions. Cumulative impacts are considered regardless of the agency or person undertaking the other actions (40 *CFR* 1508.7, CEQ 1997) and can result from the combined or synergistic effects of individually minor actions over a period of time. This section describes past and present actions, as well as reasonably foreseeable future actions, that are considered pertinent to the analysis of cumulative impacts for the proposed action.

The DOE-PORTS Environmental Restoration Program was developed in 1989 to find, analyze, and correct site contamination problems as quickly and inexpensively as possible. This task may be accomplished by removing, stabilizing, or treating hazardous wastes. As of December 31, 1998, certification of closure had been received from Ohio EPA for 18 RCRA facilities:

- X-744G(U) container storage facility,
- X-735 landfill (cells 1 through 6),
- X-616 surface impoundments,
- X-705A incinerator,
- X-749 landfill (northern portion),
- X-749 landfill (southern portion),
- X-750 waste oil tank,
- X-752 container storage facility,
- X-700 tank 6 generator closure,
- X-700 chromic acid tank 7,
- X-700 tank 8 generator closure,
- X-744G(R) container storage facility,
- X-749A classified landfill,
- X-344A settling tank,
- X-740A waste oil facility,
- X-740 tank,
- X-735 industrial solid waste landfill, and
- X-326 trap material storage area (DMSA #7).

The Ohio EPA has designated five RCRA units at PORTS as "integrated units." They include:

- X-231B biodegradation plot,
- X-744Y container storage,
- X-701B surface impoundments,
- X-701C neutralization pit, and
- X-230J7 holding pond.

Preliminary remedial action at these sites has been completed as required by closure plans and as directed by the Ohio EPA.

The DOE-PORTS Technology Applications Program was established in 1993 to facilitate the introduction of innovative or experimental environmental technology into the DOE-PORTS Environmental Restoration Program. The primary function of the technology program is to identify, evaluate, and test/demonstrate innovative advancements in environmental characterization and cleanup. Projects have included:

- X-231A soil fracturing demonstrations,
- X-231B in situ soil mixing with thermally enhanced vapor extraction,
- X-625 passive groundwater treatment through reactive media,
- X-749/X-120 vacuum-enhanced recovery wells,
- X-701B in situ chemical oxidation and recirculation,
- X-701B oxidant injection using the horizontal well,
- X-701B oxidant injection using lance permeation,
- X-701B vacuum-enhanced recovery using the five-spot configuration,
- 5-Unit Area (Quadrant I groundwater investigative area) oxidant injection, and
- X-701B underground steam stripping and hydrous pyrolysis/oxidation.

The DOE-PORTS Waste Management Program directs the safe storage, treatment, and disposal of waste generated by past and present operations and from current Environmental Restoration projects.

DOE-PORTS also stores USEC-generated waste in the RCRA Part B permitted storage areas. During 2000, approximately 8 million pounds of waste from PORTS were recycled, treated, or disposed.

Current activities include obtaining certification for the completed cap on the X-734 landfill, the ongoing cleanup of the X-747H scrap metal yard, and the X-616 chromium sludge shipment project. Five groundwater treatment facilities have also been constructed and are operational.

Planned environmental management activities include:

- complete corrective measures for Quads I and II,
- upgrade capacity/efficiency of X-622 groundwater treatment facility,
- disposal of 11,764 PCB/low-level waste containers in process buildings and outside storage areas, and
- disposal of 3877 containers of RCRA low-level waste.

Long-term environmental management milestones include:

- by the end of 2002, assessments and agency-required remedial actions completed;
- by the end of 2006, all DOE-PORTS environmental management waste shipped for final disposition; and
- beyond 2006, continued operations of active and passive groundwater treatment systems, site-wide groundwater protection program ongoing, and long-term surveillance and maintenance of remedial action and D&D facilities.

4.13.1 Proposed DOE Program to Secure Supply of Enriched Uranium

On October 6, 2000, Energy Secretary Bill Richardson announced a plan to further protect U.S. energy security by placing the GDP at PORTS in cold standby.

On March 1, 2001, Energy Secretary Spencer Abraham announced that DOE would provide $125.7 million for winterizing, cold standby, and worker transition programs related to the ongoing transition at PORTS. In general, the $125.7 million will be broken down over two years; $59.2 million for FY 2001 and $66.5 million for FY 2002. The money will support placing the facility in cold standby mode, winterizing steps to protect the facility, and worker transition programs for displaced workers once the facility is placed into cold standby mode.

Cold standby involves placing those portions of the GDP needed for 3 million separative work units per year production capacity in a non-operational condition and performing surveillance and maintenance activities necessary to retain the ability to resume operations after a set of restart activities are conducted. Feed and withdrawal systems would also be in standby. A cadre of cascade operators, utilities operators, and maintenance staff would be retained and would form the basis for future restart, operations, and maintenance. The power load would decrease to about 15 MW. Specific steps to go into cold standby include:

- removing uranium deposits in certain portions of the cascades,
- buffering of process cells with dry air to prevent wet air in-leakage,

- installing cell buffer alarms to assure that proper integrity of the system is maintained, and
- revising operating and maintenance procedures.

Other issues related to cold standby include the need to dispose of all HEU-contaminated equipment (potential need for disposal cell at PORTS), state regulatory issues and interface, nuclear safety regulatory strategy, and contracting arrangements.

4.13.2 Depleted UF_6 Conversion Facility

In April 1999, DOE issued a *Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride* (DOE/EIS-0269) that described the preferred alternative for managing depleted UF_6. The Record of Decision (ROD) was issued in August 1999.

DOE has proposed to design, construct, and operate conversion facilities at PORTS and the Paducah Gaseous Diffusion Plant (PGDP) in Kentucky. These facilities would convert DOE's inventory of depleted UF_6 now located at PORTS, PGDP, and the East Tennessee Technology Park in Oak Ridge, Tennessee, to triuranium octaoxide, uranium dioxide, uranium tetrafluoride, uranium metal, or some other stable chemical form acceptable for transportation, beneficial use/reuse, and/or disposal. A related objective is to provide cylinder surveillance and maintenance of the DOE inventory of depleted UF_6, low-enrichment UF_6, natural assay UF_6, and empty and heel cylinders in a safe and environmentally acceptable manner.

Although no site has been selected until a separate NEPA review has been conducted and a ROD has been issued, the candidate site for the conversion facility at PORTS is the lithium warehouse area. This is an area surrounding and including warehouses X-744S, -T, and -U. The candidate site, in general, is bounded on the west side by an unnamed road west of X-744T; on the north and east side by a truck access road; and on the east and south side by a dirt construction road. Excluded from this area are Buildings X-616, X-106B, and X-106C.

4.13.3 Reindustrialization Program

Several ongoing initiatives are underway at PORTS in coordination with SODI, the recognized community reuse organization for PORTS. DOE's Office of Worker and Community Transition established community reuse organizations to minimize the negative effects of workforce restructuring at DOE facilities that have played an historic role in the nation's defense. These organizations provide assistance to the neighboring communities negatively affected by changes at these sites.

SODI was established in August 1995 and was incorporated as a non-profit organization in July 1997. The purpose of the organization is to create job opportunities within the four counties most affected by PORTS downsizing—Pike, Ross, Jackson, and Scioto. SODI members represent business, industry, education, economic development, government, DOE, BJC, and USEC. A Community Transition Plan was completed in 1997 and contains a series of initiatives designed to create the human and physical infrastructure necessary to decrease dependency on the DOE facility, diversify the economy, create high-wage jobs, strengthen the tax base, and improve the quality of life in the area.

DOE has provided $10 million dollars through grants to SODI for economic development projects and has committed an additional $2.95 million for FY 2000–2001. SODI has invested this money primarily in the development of industrial parks in each of the four counties. In addition, SODI actively promotes the reuse of DOE property by private industry. The first lease between DOE and SODI was signed on April 1, 1998, for 2.4 to 3.2 ha (6 to 8 acres) of land on the north side of the PORTS property.

The tract was used as a ROW for a railroad spur to connect with the existing DOE north rail spur. A portion of this property was then subleased by SODI to the Mead Corporation for access to the rail line for a new wood grading operation. This action was covered under a NEPA Categorical Exclusion (CX) No. CX-POR-522 completed in 1997. A second lease between DOE and SODI was signed on October 13, 2000, for 4.9 ha (12 acres) of land adjacent to the area of the first lease. This tract will be used for additional railroad spurs and use of existing rail facilities. This action was covered under CX-PORTS-538.

Additional DOE real estate outgrants that have recently occurred at PORTS include the following:

- ROW easement for a waterline and sewer line,
- license for non-federal use of property for concurrent road usage,
- recreational license to Scioto Township for development of a community park,
- greenway licenses to Scioto Township and Seal Township, and
- lease/license (short-term) for use of parking lots by SODI.

4.13.4 Other Regional Industrial Developments

There are several other industrial parks in the area that, if successful, may increase employment in the ROI (Table 4.1). Most of these parks are relatively new, and their potential for new job creation is unknown. The cumulative impact would depend on the total number of jobs created throughout the region and on the type of wages paid by the industries that located there. If all of these parks developed rapidly within the next 10 years, there could be a large cumulative impact on employment and income. However, such rapid development in a chronically depressed region would be highly unusual.

Table 4.1. Additional industrial parks in the PORTS ROI

County	Site name	No. of acres
Jackson	Jackson Area Industrial Park	200
	Gettles Site	75
Pike	Zahn’s Corner	376
	Scioto Township Industrial Park	200
Ross	Gateway	90
Scioto	New Boston	70
	Haverhill	1065
	522 Site	172

Source: Chandler 2000, Justice 2000, and ODOD 1999–2000.

4.13.5 Impacts

Potential cumulative impacts that could occur from the proposed action to provide an alternate heating system to accomplish winterization of PORTS facilities following placement of the gaseous diffusion plant in cold standby and the other actions described previously are presented in the following sections. Detailed environmental impact analysis of many of these actions is beyond the scope of this EA and would be subject to separate NEPA review.

4.13.5.1 Land and facility use

Impacts from the other actions described in the previous sections have the potential to affect land and facility use at PORTS. Placing the GDP in cold standby and construction and operation of the depleted UF_6 conversion facility would potentially limit (at least in the short term) the land and facilities that could be developed or reused under the proposed reindustrialization program. Direct incremental impacts of the proposed action on the development of other industrial properties in the region are unlikely.

4.13.5.2 Air quality

The proposed action would have minimal impacts on local or regional air quality. The existing air quality of the region is considered to be good and is in attainment for all of the NAAQS. Air emissions from the other actions described previously would only be expected to have minor impacts and not violate any of the NAAQS. Fugitive dust emissions from construction activities would be temporary and controlled by mitigation measures (e.g., watering and covering exposed soil piles).

4.13.5.3 Soil and water resources

Construction-related disturbance of natural soils would occur under the proposed action. These types of impacts would be temporary and mitigated through the use of BMPs. Accidental spills and releases of hazardous materials could also potentially impact soils. Impacts to surface water and groundwater resources could also occur during construction activities, but they also would be mitigated. None of the actions discussed previously would be expected to have major discharges of industrial effluents that could adversely impact water resources.

4.13.5.4 Ecological resources

Construction activities associated with the proposed action could result in minor, temporary disturbance to existing habitats and biota. However, no federal- or state-listed threatened and endangered species are known to exist in the area of the proposed action. Emissions and effluents from the operation of the proposed actions should not be of sufficient quantity to have major adverse impacts (e.g., stress, impairment, injury, or mortality) on existing habitats and biota. Accidental releases from ongoing and proposed operations could impact ecological resources if adequate mitigation measures were not in place and implemented.

4.13.5.5 Socioeconomics and environmental justice

No cumulative socioeconomic impacts are expected to occur from the proposed action.

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, requires agencies to identify and address disproportionately high and adverse human health or environmental effects their activities may have on minority and low-income populations. As discussed in Sect. 3.8, only one census tract (9937) in the ROI includes a minority population, and this population is located several miles south of PORTS in the city of Portsmouth. Therefore, there would be no disproportionate impact on minority populations. Many of the tracts in the ROI meet the definition of low-income populations, especially the tracts nearest the site in Pike County. However, no disproportionately high and adverse human health or environmental impacts to these low-income populations are expected to result from the implementation of the proposed action. No cumulative environmental justice impacts would be expected to occur from the proposed action. Environmental justice and census tract data for the PORTS region are presented in Sect. 3.8.

4.13.5.6 Infrastructure and support services

No cumulative transportation impacts are expected from the proposed action. Implementation of the proposed action discussed previously would not require any major upgrades to existing transportation systems or major new construction of roads or rail facilities. A small increase in truck traffic could be expected during construction activities. An increase in fuel-oil tanker trucks on U.S. Route 23 and/or U.S Route 32 would occur especially during the initial filling of the fuel oil tanks; routine delivery of fuel oil would be limited to approximately 5 fuel-oil tanker trucks per day. These minor transportation impacts would be further reduced upon completion of the natural gas pipeline. Impacts to transportation in the area would not require modification of roads or other infrastructures to accommodate additional traffic.

Associated with increases in traffic is the potential for an increased number of accidents, additional noise and air pollution, and road deterioration and damage. The increase in average daily traffic volumes could result in inconveniences for other vehicles (personal and commercial) on affected routes and connecting roads. Increased pavement deterioration and damage could increase costs associated with maintaining or resurfacing roads and highways. Although noise associated with increases in traffic is normally not harmful to hearing, increased traffic noise is considered by the public to be a nuisance. Increased accidents put an additional strain on local emergency response personnel. Increased vehicular traffic also has the greatest potential to increase air pollution in the local area because emissions from motor vehicles are poorly regulated.

4.13.5.7 Human health and accidents

Cumulative public and occupational health impacts would be expected to be equal to or less than those that currently exist in and around PORTS.

5. REGULATORY COMPLIANCE

During the NEPA process, DOE contacts the USFWS to obtain the latest information on threatened and endangered species or designated critical habitats that could occur in the vicinity of the proposed action. If DOE determines that any threatened and endangered species or critical habitat could be adversely impacted by the proposed action, informal or formal consultation with the USFWS is initiated under Section 7 of the Endangered Species Act (16 U.S.C. 1531 et seq.). Threatened and endangered species at PORTS are discussed in Sects. 3.6 and 4.6.

DOE is also required under Section 106 of the NHPA to consult with the SHPO regarding the presence of archaeological and historic sites and the potential for adverse impacts at a proposed project site. Consultation with the Ohio SHPO is discussed in Sect. 4.7.3. Also, under the Farmland Protection Policy Act, DOE consults with the Natural Resource Conservation Service regarding the presence and future use of prime farmland soils at a proposed site.

DOE activities at PORTS are required to operate in accordance with environmental regulations established by federal and state laws, executive orders, DOE orders, and compliance agreements. Most DOE-PORTS cleanup activities are conducted under a Consent Decree with the State of Ohio and an Administrative Consent Order with the Ohio EPA and U.S. EPA. While environmental restoration activities are implemented in accordance with the RCRA Corrective Action Program, the Administrative Consent Order cites CERCLA as a governing authority in addition to RCRA. CERCLA establishes many requirements for transfer of federally owned property, including property that has been contaminated or property that can be identified as uncontaminated.

Relevant DOE orders pertain to the proposed action include DOE Order 430.1A, *Life Cycle Asset Management*; DOE Order 5400.1, *General Environmental Protection Program*; and DOE Order 5400.5, *Radiation Protection of the Public and the Environment*. Regulations implementing the CAA, CWA, NRC rules, RCRA, Safe Drinking Water Act, TSCA, Emergency Planning and Community-Right-to-Know Act, and others may apply.

LIST OF AGENCIES AND PERSONS CONTACTED

The following agencies and persons were contacted for information and data used in the preparation of this EA (copies are provided in Appendix B).

Name	Affiliation	Location	Topic
Pat Jones	Ohio Department of Natural Resources	Columbus, Ohio	Threatened and Endangered Species
Kent Kroonemeyer	U.S. Fish and Wildlife Service	Reynoldsburg, Ohio	Endangered Species Act, Section 7 Informal Consultation
David Snyder	Ohio Historic Preservation Office	Columbus, Ohio	National Historic Preservation Act, Section 106 Compliance

6. REFERENCES

The American Hospital Directory, Inc. 1999. *American Hospital Directory,* August 28, 2000, http://www.ahd.com.

Battelle 1976. *Research and Evaluation of Selected Environmental Aspects of the Portsmouth Gaseous Diffusion Plant in Scioto and Seal Townships, Pike County, Ohio,* Battelle Columbus Laboratories, Battelle, Ohio.

Bureau of Economic Analysis 1999. Regional Economic Information System (1969–97), July 26 and 27, 2000, http://govinfo.library.orst.edu.

Bureau of Labor Market Information 2000. *Civilian Labor Force Estimates*, July 27, 2000, http://lmi.state.oh.us/LAUS/LAUS.html, Bureau of Labor Market Information, Ohio Department of Job and Family Services.

Bureau of the Census 1990a. Summary Tape File C90STF3A, August 1, 2000, http://venus.census.gov.cdrom/lookup.

Bureau of the Census 1990b. *Census Historical Poverty Tables*, Table CPH-L-162, August 1, 2000, http://www.census.gov/hhes/poverty/census/cphl162.html.

Bureau of the Census 2000. *Population, Land Area, and Poverty Data for 1990 Census Tracts,* accessed August 8, 2000, www.census.gov/geo/www/ezstate/poverty.html.

Chandler, J., Southern Ohio Diversification Initiative 2000. Personal communication to Sharon Bell and Michael Deacon, Science Applications International Corporation, Portsmouth environmental assessment team members (August 15).

Church, F., Dobson-Brown, D. L., Coleman, K. B., Herr, D., Kramb, A., and Schweikart, J. 1997. *Portsmouth Gaseous Diffusion System Facility Cultural Resource Management Plan* (submitted to Lockheed Martin Energy Systems, Piketon, OH), ASC Group, Columbus, OH.

Coleman, K., Dobson-Brown, D., and Herr, D. 1997. *Phase I Architectural Survey for the Portsmouth Gaseous Diffusion Plant (PORTS Facility) in Scioto and Seal Townships, Pike County, Ohio* (submitted to, and copies available from, the U.S. Department of Energy), ASC Group, Columbus, OH.

Dobson-Brown, D., Church, F., and Schweikart, J. 1996. *Management Summary for the PORTS Cultural Resource Literature Review, Predictive Model, and Preliminary Reconnaissance Survey in Scioto and Seal Townships, Pike County, Ohio* (submitted to Lockheed Martin Energy Systems, Inc.), ASC Group, Columbus, OH.

DOE (U. S. Department of Energy) 1989. *Environmental Assessment (Adopted) – National Fuel Gas Supply Corporation*, Office of Fuels Programs and Fossil Energy, DOE/EA-0409, Washington, D.C.

DOE (U.S. Department of Energy) 1993. *Portsmouth Gaseous Diffusion Plant Environmental Report for 1992*, ES/ESH-37, Oak Ridge, TN.

DOE 1995. *Environmental Assessment: Construction and Operation of an Industrial Solid Waste Landfill at Portsmouth Gaseous Diffusion Plant, Piketon, Ohio,* DOE/EA-0767, Oak Ridge, TN.

DOE 1996a. *Quadrant III RCRA Facility Investigation Final Report,* DOE/OR/11-1308/VI&D3.

DOE 1996b. *Wetland Survey Report for the Portsmouth Gaseous Diffusion Plant,* POEF-LMES-106, Lockheed Martin Energy Systems, Inc., Piketon, OH.

DOE 1996c. *Baseline Ecological Risk Assessment, Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*, DOE/OR/11-1316/V1&D2, Oak Ridge, TN.

DOE 1997a. *Final Threatened and Endangered Species Report-Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*, DOE/OR/11/1668&D0, Lockheed Martin Energy Systems, Inc., Piketon, OH.

DOE 1999a. *Portsmouth Annual Environmental Report for 1998*, DOE/OR/11-3031, December.

DOE 1999b. *Quadrant II, Cleanup Alternatives Study/Corrective Measures Study, Final Report. Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*, DOE/OR/12-1223&D3.

DOE 2000a. *Portsmouth Annual Environmental Report for 1999*, November.

ERDA (Energy Research & Development Administration) 1977. *Final Environmental Impact Statement: Portsmouth Gaseous Diffusion Plant Site, Piketon, Ohio,* Vol. 2, ERDA-1555.

Henderson, D. 1997. "Preliminary Report: Impact Study for PORTS Facility," Ohio State University, Piketon Research and Extension Center, May 13.

Justice, T. J., Regional Economic Development Office: Region 7, Chillicothe, OH 2000. Personal communication to Sharon Bell, Science Applications International Corporation, environmental assessment team (September 18 and 20).

LMES (Lockheed Martin Energy Systems, Inc.) 1997. *Safety Analysis Report Volume 1, Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*, POEF-LMES-89, Paducah, KY.

Magrab, E. B. 1975. *Environmental Noise Control*, Wiley-Interscience Publication, John Wiley & Sons, New York.

MMES (Martin Marietta Energy Systems, Inc.) 1994. *Portsmouth Gaseous Diffusion Plant Siting Criteria Document*, DOE/OR/111267&D1, Portsmouth, OH, April.

ODOD (Ohio Department of Development) 1999. Office of Strategic Research, *Ohio County Profiles,* July 27, 2000, http://www.oded.state.oh.us/osr/profiles.

Ohio EPA (Ohio Environmental Protection Agency) 1993. *Biological, Fish Tissue, and Sediment Quality in Little Beaver Creek, Big Beaver Creek, Big Run, and West Ditch, Piketon (Portsmouth Gaseous Diffusion Plant), Ohio*, State of Ohio Environmental Protection Agency, Ecological Assessment Section, Division of Water Quality Planning and Assessment, Columbus, OH, May.

Ohio EPA 1998. “Biological and Water Quality Study of Little Beaver Creek and Big Beaver Creek– 1997.”

ORNL (Oak Ridge National Laboratory) 1999. *Comprehensive Integrated Planning Process for the Oak Ridge Operations Sites*, ORNL/M-6717, Bechtel Jacobs Company LLC, Lockheed Martin Energy Research Corporation, and Lockheed Martin Energy Systems, Inc., Oak Ridge, TN, September.

Schweikart, J. F., Coleman, K., and Church, F. 1997. *Phase I Archaeological Survey for the Portsmouth Gaseous Diffusion Plant (PORTS Facility) in Scioto and Seal Townships, Pike County, Ohio* (submitted to, and copies available from, the U.S. Department of Energy), ASC Group, Columbus, OH.

SODI (Southern Ohio Diversification Initiative) 1997. *Southern Ohio Diversification Initiative's Community Transition Plan* (submitted to the U.S. Department of Energy), Piketon, OH, August.

Tetra Tech, Inc., and Theta Technologies Inc., 2000. *Final Engineering Study Alternative Heating GCEP/GDP Facilities at Portsmouth,* Oak Ridge, TN, December.

USACE (U.S. Army Corps of Engineers) 1987. *Corps of Engineers Wetlands Delineation Manual*, Technical Report Y-87-1, Department of the Army.

USDA (U.S. Department of Agriculture) 1990. *Soil Survey of Pike County, Ohio*, Washington, D.C.

USEC (United States Enrichment Corporation) 2000. “USEC to Cease Uranium Enrichment at the Portsmouth, Ohio Facility in June 2001,” June 21.

APPENDIX A

FLOODPLAIN AND WETLAND SURVEY FOR NATURAL GAS PIPELINE INSTALLATION

(WILL BE INCLUDED UPON COMPLETION OF SURVEY)

APPENDIX B

COPIES OF CONSULTATION LETTERS

APPENDIX C

AN ARCHAEOLOGICAL SURVEY FOR NATURAL GAS PIPELINE INSTALLATION AT THE PORTSMOUTH GASEOUS DIFFUSION PLANT, PIKE COUNTY, OHIO

(WILL BE INCLUDED UPON COMPLETION OF SURVEY)

APPENDIX D

VERTEBRATE SPECIES OBSERVED AT PORTS

Table D.1. Vertebrate species observed on the reservation of the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio

Scientific name	Common name	Scientific name	Common name
Mammals			
Blarina brevicauda	short-tailed shrew	*Odocoileus virginianus*	white-tailed deer
Bos taurus	cattle	*Ondatra zibethicus*	muskrat
Canis familiaris	dog	*Peromyscus leucopus*	white-footed mouse
Didelphis virginiana	opossum	*Peromyscus maniculatus*	deer mouse
Eptesicus fuscus	big brown bat	*Pipistrellus subflavus*	eastern pipistrelle
Felis domestica	house cat	*Procyon lotor*	raccoon
Glaucomys volans	southern flying squirrel	*Reithrodontomys humulis*	eastern harvest mouse
Lasiurus borealis	red bat	*S. carolinensis*	gray squirrel
Marmota monax	woodchuck	*Sciurus carolinensis*	fox squirrel
Microtus pennsylvanicus	meadow vole	*Sorex cinereus*	masked shrew
Mus musculus	house mouse	*Sylvilagus floridans*	eastern cottontail rabbit
Mustela frenata	long-tailed weasel	*Tamius striatus*	eastern chipmunk
Myotis lucifugus	little brown bat	*Urocyon cinereoargenteus*	gray fox
Myotis septentrionalis	northern long ear bat	*Vulpes vulpes*	red fox
Reptiles and Amphibians			
Bufo americanus	American toad	*Hyla c. crucifer*	northern spring peeper
Bufo woodhousei fowleri	Fowler's toad	*Natrix s. sipedon*	northern water snake
Chelydra serpentina	snapping turtle	*Opheodrys aestivus*	rough green snake
Chrysemys picta	midland painted turtle	*Rana catesbeiana*	bullfrog
Columber c. constrictor	northern black racer	*Rana p. pipiens*	northern leopard frog
Desmognathus f. fuscus	northern dusky salamander	*Terrapene c. carolina*	eastern box turtle
Elaphe o. obsoleta	black rat snake	*Thamnophis s. sirtalis*	eastern garter snake
Graptemys geographica	map turtle	*Trionyx s. spinifer*	eastern spiny softshell turtle
Heterodon playtrhinos	eastern hognose snake		
Birds			
Accipiter cooperii	Cooper's hawk	*Guiraca caerulea*	blue grosbeak
Accipiter striatus	sharp-shinned hawk	*Hirundo rustica*	barn swallow
Actitis macularia	spotted sandpiper	*Hylocichla guttata faxoni*	hermit thrush
Agelaius phoeniceus	red-winged blackbird	*Hylocichla mustelina*	wood thrush
Aix sponsa	wood duck	*Icteria virens virens*	yellow-breasted chat
Ammodramus henslowii	Henslow's sparrow	*Icterus galbula*	northern oriole
Ammodramus savannarum	grasshopper sparrow	*Junco hyemalis*	dark-eyed junco
Anas crecca	green-winged teal	*Lophodytes cucullatus*	hooded meganser
Anas discors	blue-winged teal	*Megaceryle alcyon*	belted kingfisher
Anas platyrhynchos	mallard	*Melanerpes erythrocephalus*	red-headed woodpecker
Anas rubripes	black duck	*Meleagris gallopauo*	wild turkey
Anas strepera	gadwall	*Melospiza georgiana*	swamp sparrow
Archilochus colubris	ruby-throated hummingbird	*Melospiza melodia*	song sparrow
Ardea herodias	great blue heron	*Mimus polyglottos*	mockingbird

Table D.1. (continued)

Scientific name	Common name	Scientific name	Common name
Birds			
Aythya affinis	lesser scaup	*Molothus ater ater*	brown-headed cowbird
Aythya collaris	ring-necked duck	*Myiarchus crinitus*	great crested flycatcher
Bombycilla cedrorum	cedar waxwing	*Oporornis formosus*	Kentucky warbler
Bonasa umbellus	ruffed grouse	*Otus asio*	screech owl
Botarus lentiginosus	American bittern	*Parus atricapillus*	black-capped chickadee
Bucephala albeola	bufflehead	*Parus bicolor*	tufted titmouse
Buteo jamaicensis	red-tailed hawk	*Parus carolinensis*	Carolina chickadee
Butorides virescens	green heron	*Passerculus sandwichensis*	savannah sparrow
Calidres alpina	dunlin	*Passerina cyanea*	indigo bunting
Calidres melanotos	pectoral sandpiper	*Philohela minor*	American woodcock
Calidres minutilla	least sandpiper	*Pipilo erythropthalmus*	rufous-sided towhee
Calidris pusillus	semipalmated sandpiper	*Piranga olivacea*	scarlet tanager
Capodacus purpureus	purple finch	*Piranga rubra*	summer tanager
Caprimulgus vociferus	whippoorwill	*Podilymbus podiceps*	pied-billed grebe
Cardinalis cardinalis	cardinal	*Polioptila caerulea caerulea*	blue-gray gnatcatcher
Cathartes aura	turkey vulture	*Progne subis*	purple martin
Centurus carolinus	red-bellied woodpecker	*Regulus calendula calendula*	ruby-crowned kinglet
Certhia familiaris	brown creeper	*Regulus satrapa satrapa*	golden-crowned kinglet
Chaetura pelagica	chimney swift	*Sayornis phoebe*	eastern phoebe
Charadrius vociferus	killdeer	*Seiurus aurocapillus*	ovenbird
Circus cyaneus	marsh hawk	*Siala sialis*	eastern bluebird
Coccyzus americanus	yellow-billed cuckoo	*Sitta canadensis*	red-breasted nuthatch
Coccyzus erythropthalamus	black -billed cuckoo	*Sitta carolinensis*	white-breasted nuthatch
Colaptes aurantus	common flicker	*Sphyrapicus varius*	yellow-bellied sapsucker
Colinus virginianus	bobwhite	*Spinus pinus*	pine siskin
Columba livia	rock dove	*Spinus tristis*	American goldfinch
Contopus virens	eastern wood pewee	*Spizella arborea*	tree sparrow
Corvus brachyrhynchos	common crow	*Spizella passerina*	chipping sparrow
Cyanocitta cristata	blue jay	*Spizella pusilla*	field sparrow
Dendrocopos pubescens	downy woodpecker	*Sturnella magna magna*	eastern meadowlark
Dendrocopos villosus	hairy woodpecker	*Sturnus vulgaris vulgaris*	starling
Dendroica coronata coronata	yellow-rumped warbler	*Thryothorus ludovicianus*	Carolina wren
Dendroica discolor	prairie warbler	*Toxostoma rufum rufum*	brown thrasher
Dendroica petechia	yellow warbler	*Tringa flavipes*	lesser yellowlegs
Dendroica virens	black-throated green warbler	*Tringa melanoleucus*	greater yellowlegs
Drycopus pileatus	pileated woodpecker	*Turdus migratorius*	American robin
Dumetella carolinensis	gray catbird	*Tyrannus tyrannus*	eastern kingbird
Empidonax traillii	willow flycatcher	*Vermivora pinus*	blue-winged warbler
Empidonax virescens	acadian flycatcher	*Vireo griseus*	white-eyed vireo
Falco sparverius	American kestrel	*Vireo olivaceus*	red-eyed vireo
Fulica americanus	American coot	*Zenaida macroura*	mourning dove
Gavia immer	common loon	*Zonotrichia albicollis*	white-throated sparrow
Geothlypis trichas	common yellowthroat	*Zonotrichia leucophrys*	white-crowned sparrow

Table D.1. (continued)

Scientific name	Common name	Scientific name	Common name
Fish (Note: Fish species were observed in the streams in and immediately surrounding the Plant.)			
Ambloplities rupestris	rock bass	*Lythrurus umbratilius*	redfin shiner
Ameiurus natalis	yellow bullhead	*Maxostoma duquesnei*	black redhorse
Aplodinatus grunniens	freshwater drum	*Micropterus dolmieui*	smallmouth bass
Campostoma anomalum	central stoneroller	*Micropterus punctulatus*	spotted bass
Catostomus commersoni	white sucker	*Micropterus salmoides*	largemouth bass
Cyprinella spiloptera	spotfin shiner	*Minytrema melanops*	spotted sucker
Cyprinella whippplei	steelcolor shiner	*Moxostoma erythrurum*	golden redhorse
Cyprinus carpio	common carp	*Moxostoma macrolepidotum*	shorthead redhorse
Dorosoma cepedianum	gizzard shad	*Notropis atherinoides*	emerald shiner
Esox americanus vermiculatus	grass pickerel	*Notropis buccatus*	silverjaw minnow
Etheostoma blennoides	greenside darter	*Notropis rubellus*	rosyface shiner
Etheostoma caeruleum	rainbow darter	*Notropis stramineus*	sand shiner
Etheostoma flabellare	fantail darter	*Noturus flavus*	stonecat madtom
Etheostoma nigrum	Johnny darter	*Noturus miuris*	brindled madtom
Etheostoma spectabile	orangethroat darter	*Percina caprodes*	logperch
Etheostoma zonale	banded darter	*Percina maculata*	blackside darter
Fundulus notatus	blackstripe topminnow	*Percina sciera*	dusky darter
Hypentelium nigricans	northern hogsucker	*Percopsis omiscomaycus*	trout-perch
Ictaluris punctatus	channel catfish	*Phenacobius mirabilis*	suckermouth minnow
Labidesthes sicculus	brook silverside	*Phoxinus erythrogaster*	southern redbelly dace
Lepisosteus osseus	longnose gar	*Pimephales notatus*	bluntnose minnow
Lepomis cyanellus	green sunfish	*Pimephales vigilax*	bullhead minnow
Lepomis macrochirus	Bluegill	*Pomoxis annularis*	white crappie
Lepomis megalotis	longear sunfish	*Rhinichthys atratulus*	blacknose dace
Luxilus chrysocephalus	striped shiner	*Semotilus atromaculatus*	creek chub
Lythrurus ardens	rosefin shiner	*Stizostedion canadense*	sauger
Lythrurus umbratilis	redfin shiner	*Stizostedion vitreum*	walleye

Sources:

U.S. Department of Energy. 1994. *Baseline Ecological Risk Assessment, Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*. Volume 3: Appendices C–E. DOE/OR/11-1316/V3&D1. 0-04-04/32.010.

U.S. Department of Energy. 1994. *Baseline Ecological Risk Assessment, Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*. Volume 5: Appendices K–Q. DOE/OR/11-1316/V5&D1. 0-04-04/32.012.

Energy Research & Development Administration. *Final Environmental Impact Statement: Portsmouth Gaseous Diffusion Plant Site, Piketon, Ohio*. Volume 2: Appendices. ERDA -1555.

Lockheed Martin Energy Systems, Inc. 1998. *Final Threatened and Endangered Species Report: Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*. DOE/OR/11/1668&D0

Ohio Environmental Protection Agency. 1998. *Biological and Water Quality Study of Little Beaver Creek and Big Beaver Creek - 1997. Portsmouth Gaseous Diffusion Plant, Pike County, Ohio*. Ohio EPA Technical Report MAS/1998-5-1.

APPENDIX E

ARCHAEOLOGICAL AND HISTORICAL ARCHITECTURAL RESOURCES

Table E.1. PORTS archaeological resources that do not meet the NRCE

OAI/OHI No.	Quadrant	Temporal affiliations	Site name
33 Pk 186	I	Unassigned Prehistoric	Lithic Scatter
33 Pk 187	I	Historic (ca. 1915–1951)	Farmstead Remnant
33 Pk 188	I	Historic (post 1952)	Worker Barracks
33 Pk 189	IV	Unassigned Prehistoric/Historic (post 1952)	Isolated Find & Tower Platform
33 Pk 190	I	Historic (post 1952)	Radio Tower Base
33 Pk 191	I	Historic (ca. 1830s–present)	Open Dump
33 Pk 192	I	Historic (ca. 1900–present)	Open Dump
33 Pk 196	I	Historic (ca. 1952–present)	Culvert/Drain Pipes
33 Pk 198	IV	Unassigned Prehistoric	Isolated Find
33 Pk 199	IV	Historic (ca. 1820–present)	Isolated Find
33 Pk 200	IV	Historic (ca. 1820–present)	Historic Scatter
33 Pk 201	IV	Historic (ca. 1890–present)	Isolated Find
33 Pk 202	IV	Historic (ca. 1934–present)	Historic Scatter
33 Pk 204	IV	Unassigned Prehistoric	Isolated Find
33 Pk 205	IV	Unassigned Prehistoric	Isolated Find
33 Pk 206	II	Unassigned Prehistoric	Lithic Scatter
33 Pk 207	II	Unassigned Prehistoric	Isolated Find
33 Pk 208	II	Unassigned Prehistoric	Isolated Find
33 Pk 209	I	Historic (ca. 1933–1964)	Historic Scatter
33 Pk 215	IV	Historic (ca. 1820–present)	Open Dump
33 Pk 216	IV	Historic (ca. 1879–present)	Open Dump
33 Pk 219	IV	Historic (post 1952)	Old Firing Range

Source: Schweikart et al. 1997.

Table E.2. PORTS archaeological resources recommended for Phase II assessments to determine if they meet the NRCE

OAH/OHI No.	Quadrant	Temporal affiliations	Site name
33 Pk 184	I	Historic (ca. 1820–present)	Davis Farmstead
33 Pk 185	I	Historic (ca. 1900–present)	South Shyville Farmstead
33 Pk 193	I	Historic (ca. 1820–present)	Iron Wheel Farmstead
33 Pk 194	II	Historic (ca. 1820–present)	North Shyville Farmstead
33 Pk 195	I	Historic (ca. 1820–present)	Beaver Road Farmstead
33 Pk 197	II	Historic (ca. 1951)	Dutch Run Road Farmstead
33 Pk 203	IV	Historic Farmstead (ca. 1820–present)	Ruby Hollow Farmstead
33 Pk 206	II	Historic (ca. 1820–present)	Terrace Farmstead
33 Pk 210	I	Unassigned Prehistoric	Southview Site (lithic scatter)
33 Pk 211	IV	Historic (1890–1964)	Bamboo Farmstead
33 Pk 212	IV	Historic (ca. 1931–present)	Railside Farmstead
33 Pk 213	IV	Historic (ca. 1820–present)	Log Pen Farmstead
33 Pk 217	IV	Historic (ca. 1820–present)	Stockdale Road Dairy
33 Pk 218 (PIK-205-12)	IV	Historic (ca. 1820–present)	Cannett Farmstead

Source: Schweikart et al. 1997

Table E.3. PORTS archaeological and architectural historic resources to which the NRCE have not been applied

OAI/OHI No.	Quadrant	Temporal affiliations	Site name
33 Pk 189 (PIK-206-9)	II	Historic (ca. 1790–present)	Mount Gilead Cemetery and Chapel Remnant
33 Pk 214 (PIK-207-12)	IV	Historic (ca. 1877–mid-20th century)	Holt Cemetery

Source: Schweikart et al. 1997.

Table E.4. Architectural resources evaluated in the DRAFT PORTS Cultural Resources Survey

OHI No.	PORTS Name	Quadrant	Date	Period	Type
PIK-45-12	Cooling Tower	II	1976	3	Heat Exchanging Structure
PIK-46-12	Cooling Tower and Uncovered Extension Basin	II	1954–1955	2	Heat Exchanging Structure
PIK-47-12	Recirculating Water Pump House	II	1953–1954	2	Mechanical Building
PIK-48-12	Cooling Tower and Uncovered Extension Basin	II	1954–1955	2	Heat Exchanging Structure
PIK-49-12	Cooling Tower	II	1978	3	Heat Exchanging Structure
PIK-50-12	Feed Vaporization and Sampling Facility	II	1981	3	Process Building
PIK-51-12	East Groundwater Treatment Facility	II	1994–1995	3	Mechanical Building
PIK-52-12	Bulk Storage Building–Non-UEA	II	1956	2	Warehouse
PIK-53-12	Neutralizing Building	II	1973	3	Mechanical Building
PIK-54-12	Bulk Storage Building	II	1953	2	Warehouse
PIK-55-12	Bulk Storage Building	II	1953	2	Warehouse
PIK-56-12	Undocumented Guard Post	II	ca. 1952–1960	2	Booth
PIK-57-12	Personnel Monitoring Building	II	1955	2	Booth
PIK-58-12	Maintenance Building	II	1957	2	Warehouse
PIK-59-12	Maintenance and Stores Warehouse	II	ca. 1983	3	Warehouse
PIK-60-12	Lime House	II	1955	2	Mechanical Building
PIK-61-12	Neutralizing Pit	II	1953	2	Basin
PIK-62-12	Converter Shop and Cleaning Facility	II	1955	2	Work Building
PIK-63-12	Water Deionization Facility	II	1955	2	Mechanical Building
PIK-64-12	Air Conditioning Equipment Building	II	1975	3	Mechanical Building
PIK-65-12	Decontamination Building	II	1955	2	Work Building
PIK-66-12	Heating Booster Pump Building	II	1983	3	Mechanical Building

Table E.4. (continued)

OHI No.	PORTS Name	Quadrant	Date	Period	Type
PIK-67-12	Special Nuclear Material Storage Building	II	1980	3	Bunker Warehouse
PIK-68-12	Radio Base Station Building	II	1978	3	Mechanical Building
PIK-69-12	Elevated Water Tank	II	1960	3	Elevated Cylinder Tank
PIK-70-12	Paint and Oil Storage Building	II	1980	3	Warehouse
PIK-71-12	Maintenance and Stores Building	II	1954	2	Work Building
PIK-72-12	Maintenance and Stores Gas Manifold Shed	II	1954	2	Covered Platform
PIK-73-12	North Portal and Shelter	I	1955	2	Booth
PIK-74-12	South Portal and Shelter	I	1955	2	Booth
PIK-75-12	Oil Drum Storage Facility	I	1954	2	Covered Platform
PIK-76-12	Gas Cylinder Storage Facility	I	1954	2	Covered Platform
PIK-77-12	Materials Receiving and Inspection	I	1954	2	Warehouse
PIK-78-12	Indoor Firing Range	I	ca. 1980–1985	3	Enclosed Firing Range Building
PIK-79-12	Guard Headquarters	I	1954, 1991	2	Office Building
PIK-80-12	Tactical Response Station	I	1955	2	Garage
PIK-81-12	Mobile Equipment Maintenance Shop	I	1953	2	Garage
PIK-82-12	Garage Storage Building	I	ca. 1953	2	Storage Shed
PIK-83-12	Auxiliary Office Building	I	1954	2	Warehouse
PIK-84-12	Plant Control Facility and Emergency Communications Antenna	I	ca. 1952–1955	2	Bunker Office Building
PIK-85-12	Process Monitoring Building	I	ca. 1954	2	Mechanical Building
PIK-86-12	Lumber Storage Facility	I	ca. 1953–1956	2	Covered Platform
PIK-87-12	Technical Service Building	I	1953, 1975	2	Laboratory Building
PIK-88-12	Explosion Test Facility	I	1956	2	Mechanical Building
PIK-89-12	Technical Service Gas Manifold Shed	I	ca. 1955	2	Covered Platform

Table E.4. (continued)

OHI No.	PORTS Name	Quadrant	Date	Period	Type
PIK-90-12	Cafeteria	I	1954	2	Cafeteria
PIK-91-12	Health Service Center	I	1954	2	Medical Building
PIK-92-12	Exchange Telephone Building	I	1954	2	Office Building
PIK-93-12	Air Conditioning Equipment Building	I	1958	3	Mechanical Building
PIK-94-12	Administration Building	I	1954	2	Office Building
PIK-95-12	Personnel Monitoring Trailer	I	1975	3	Mobile Home
PIK-96-12	Chemical Engineering Building	I	1954	2	Laboratory Building
PIK-97-12	Mechanical Test Building	I	1954	2	Mechanical Building
PIK-98-12	Steam Plant	I	1954, 1996	2	Heating Plant Structure
PIK-99-12	Steam Plant Shop Building	I	1981	3	Garage
PIK-100-12	Coal Pile Runoff Treatment Facility	I	1984	3	Mechanical Building
PIK-101-12	Recirculating Water Pump House	I	1954	2	Mechanical Building
PIK-102-12	Cooling Tower	I	1954	2	Heat Exchanging Structure
PIK-103-12	Interplant Portal	I	1985	4	Booth
PIK-104-12	Maintenance, Stores, and Training Facility	I	1985	4	Office Building, Multi-level
PIK-105-12	Plant Emergency Operations Center	I	ca. 1980–1985	4	Office Building
PIK-106-12	Fire Station	I	1981	4	Emergency Vehicle Garage
PIK-107-12	Data Processing Building	I	1984	4	Office Building
PIK-108-12	Administrative Portal - Pedestrian	I	1985	4	Booth
PIK-109-12	Administration Building	I	1981	4	Office Building
PIK-110-12	Electronic Maintenance Facility	I	ca. 1980–1985	4	Office Building
PIK-111-12	Cooling Tower Pump House	I	1984	4	Mechanical Building
PIK-112-12	Cooling Tower and Valve House	I	1984	4	Heat Exchanging Structure

Table E.4. (continued)

OHI No.	PORTS Name	Quadrant	Date	Period	Type
PIK-113-12	Undocumented Guard Booth	I	ca. 1960–1980	3	Booth
PIK-114-12	GCEP Process Building #2	I	1979–1985	4	Process Building
PIK-115-12	GCEP Process Support Building	I	1983	4	Office Building
PIK-116-12	GCEP Process Building #1	I	1979–1985	4	Process Building
PIK-117-12	GCEP Transfer Corridor	I and III	1983	4	Mechanical Corridor
PIK-118-12	Fire Water Pump House	I	ca. 1980–1985	4	Mechanical Building
PIK-119-12	Sanitary Water Storage Tank	I	ca. 1980–1985	4	Large Cylinder Tank
PIK-120-12	Fire Water Storage Tank 1	I	ca. 1980–1985	4	Large Cylinder Tank
PIK-121-12	Fire Water Storage Tank 2	I	ca. 1980–1985	4	Large Cylinder Tank
PIK-122-12	GCEP Switch House, Switchyard, Valve House and Oil Pumping Station	I	1982	4	Utility Yard
PIK-123-12	Waste Handling and Storage Facility (GCEP Feed and Withdrawal Facility)	I	ca. 1980–1985	4	Process Building
PIK-124-12	South Portal - Pedestrian	I	1985	4	Booth
PIK-125-12	South Portal - Vehicular	I	1985	4	Booth
PIK-126-12	Sewage Lift Stations	I and III	ca. 1970–1978	3	Mechanical Building
PIK-127-12	Mobile Equipment Garage	I	1979	4	Linear Garage
PIK-128-12	Warehouse K - Non-UEA	I	1953–1954, 1978	3	Warehouse
PIK-129-12	South Groundwater Treatment Facility	I	ca. 1994	3	Mechanical Building
PIK-130-12	Administration Portal - Vehicular	I	1983	4	Booth
PIK-131-12	GCEP Construction Warehouse	I	ca. 1980–1985	4	Warehouse
PIK-132-12	South pH Adjustment Facility	I	1979	3	Mechanical Building
PIK-133-12	South Environmental Sampling Building	I	1968	3	Mechanical Building
PIK-134-12	South Office Building	I	1977–1978	4	Office Building

Table E.4. (continued)

OHI No.	PORTS Name	Quadrant	Date	Period	Type
PIK-135-12	South Weather Station	I	ca. 1979, ca. 1993–1996	3	Communications Antenna
PIK-136-12	East Environmental Monitoring Station (Liquid Effluent System)	II	1981	3	Mechanical Building
PIK-137-12	Recirculating Water Pump House	II	ca. 1993–1996	3	Weatherport
PIK-138-12	Little Beaver Groundwater Treatment Facility	II	ca. 1993–1996	3	Mechanical Building
PIK-139-12	Groundwater Treatment Facility	I	ca. 1995	3	Mechanical Building
PIK-140-12	Hazardous Waste Storage Building (GCEP Recycle/ Assembly Building and GCEP Training and Test Facility)	III	1983	4	Process Building
PIK-141-12	GCEP Waste Accountability Facility	III	1984	4	Warehouse
PIK-142-12	Undocumented temporary warehouse in X-7745 R Yard	III	ca. 1996–1997	3	Weatherport
PIK-143-12	Process Building, SNM Monitoring Portals	III	1956, 1981	2	Process Building
PIK-144-12	Instrumentation Tunnels (beside X-326, X-330 and X-333)	I and III	1954	2	Utility Tunnel
PIK-145-12	Process Building	III	1955	2	Process Building
PIK-146-9	Undocumented bridge over tributary to Little Beaver Creek	IV	ca. 1930–1950, ca. 1954	1	Bridge
PIK-147-12	Switchyard, Test and Repair Building, Oil House, Valve Houses, GCEP Oil Pumping Station, undocumented building, undocumented mobile office	III	1954, 1980	2	Mechanical Building
PIK-148-12	Switch House (includes Control House, North Switch House, South Switch House)	III	1954	2	Utility Yard
PIK-149-12	Waste Oil Storage Building	III	1982	3	Weatherport
PIK-150-12	Personnel Monitoring Building	III	1955	2	Office Building
PIK-151-12	Recirculating Water Pump House	IV	ca. 1954–1955	2	Mechanical Building
PIK-152-12	Cooling Tower	IV	ca. 1954–1955	2	Heat Exchanging Structure
PIK-153-12	Cooling Tower	IV	ca. 1954–1955	2	Heat Exchanging Structure

Table E.4. (continued)

OHI No.	PORTS Name	Quadrant	Date	Period	Type
PIK-154-12	Two undocumented booths in X-745 E Yard	IV	ca. 1970–1980	3	Booth
PIK-155-12	Undocumented shed in X-745 C Yard	III	ca. 1996–1997	3	Storage Shed
PIK-156-12	Toll Enrichment Facility	IV	1958, 1971–1975	2	Process Building
PIK-157-12	Feed Vaporization and Fluorine Generation Facility	IV	1954, 1982–1983	2	Process Building
PIK-158-12	Fluorine Storage Building	IV	1954	2	Mechanical Building
PIK-159-12	Maintenance Storage Building	IV	1958	2	Warehouse
PIK-160-12	Undocumented mobile office behind X-344 A	IV	ca. 1990–1997	3	Mobile Home
PIK-161-12	Hydrofluoric Acid Storage Building, Gas Ventilation Stack, Safety Building	IV	1958	2	Weatherport
PIK-162-12	Transformer Storage and Cleaning Building	IV	1985	3	Storage Garage
PIK-163-12	Pike Avenue Portal	IV	1976	3	Booth
PIK-164-12	Switchyard, Test and Repair Facility, Oil House, Valve Houses, Gas Reclaiming Cart Garage, Electric Power Tunnels and undocumented mobile office	IV	1954, 1955, 1985, ca. 1997	2	Utility Yard
PIK-165-12	Switch House (includes Control House, East Switch House, West Switch House)	IV	1955	2	Mechanical Building
PIK-166-12	Recirculating Water Pump House	II	1960	3	Mechanical Building
PIK-167-12	Process Building	IV	1955	2	Process Building
PIK-168-12	Construction Entrance Building, Truck Scale Facility	III	1975	3	Booth
PIK-169-12	Northeast Portal – Vehicular and Northeast Portal – Pedestrian	III	1985	4	Booth
PIK-170-12	Fire Training Building	III	ca. 1993	3	Emergency Training Building
PIK-171-12	Liquid Effluent Control Facility	III	1976	3	Mechanical Building
PIK-172-12	Sanitary Sewage Treatment Facility	III	ca. 1954–1955	2	Mechanical Building
PIK-173-12	Warehouses	III	1957, 1978	2	Warehouse
PIK-174-12	Sewage Treatment Facility	III	1980	4	Mechanical Building

Table E.4. (continued)

OHI No.	PORTS Name	Quadrant	Date	Period	Type
PIK-175-12	Warehouses	III	1988	3	Warehouse
PIK-176-12	West Environmental Sampling Building	III	1968	3	Mechanical Building
PIK-177-12	West Environmental Monitoring Station	III	1981	3	Mechanical Building
PIK-178-12	Ohio Valley Electric Corporation office building	III	ca. 1954, ca. 1980–1990	2	Office Building
PIK-179-12	Ohio Valley Electric Corporation storage shed	III	ca. 1960–1980	3	Tractor Shed
PIK-180-12	Ohio Valley Electric Corporation Microwave Tower and Dish	III	ca. 1980–1990	3	Communications Antenna
PIK-181-12	Don Marquis Substation (upper tier yard)	III	ca. 1954–1970	2	Utility Yard
PIK-182-12	Don Marquis Substation (lower tier yard)	III	ca. 1954–1970	2	Utility Yard
PIK-183-12	Warehouse	IV	1978	3	Warehouse
PIK-184-12	Salt Storage Building	IV	1979	3	Bin
PIK-185-12	Surplus and Salvage Warehouse	IV	1957, 1983	2	Warehouse
PIK-186-12	North Holding Pond Storage Building	IV	1981	3	Mechanical Building
PIK-187-12	North Environmental Storage Building	IV	ca. 1986	3	Booth
PIK-188-12	Booster Pump House and Appurtenances, Chlorinator Building, Diesel Generator Building	IV	1954	2	Mechanical Building
PIK-189-9	Landfill Utility Building	IV	1980	3	Storage Garage
PIK-190-12	Elevated Water Tank	III	ca. 1960	3	Elevated Cylinder Tank
PIK-191-12	Water Treatment Plant Chemical Building and Mixing and Settling Basins	IV	1954	2	Mechanical Building
PIK-192-12	Water Treatment Plant Filter Building, Chlorine Building and Recarbonation Building	IV	1954, 1979, ca. 1993–1997	2	Mechanical Building
PIK-193-12	Northeast Environmental Monitoring Station	IV	1981	3	Mechanical Building
PIK-194-12	Former Firing Range	IV	ca. 1960–1970	3	Weatherport

Table E.4. (continued)

OHI No.	PORTS Name	Quadrant	Date	Period	Type
PIK-195-12	Undocumented pipeline from Water Treatment Plant to X-611 B Sludge Lagoon	IV	1979–1980	3	Pipeline
PIK-196-12	Undocumented sludge lagoon environmental monitoring station	IV	ca. 1980	3	Mechanical Building
PIK-197-9	Firing Range (New)	IV	ca. 1990	3	Open Firing Range
PIK-198-9	Undocumented water pipeline building near Little Beaver Creek	IV	ca. 1954	2	Mechanical Building
PIK-199-9	Undocumented railroad overpass over North Access Road	IV	1923, ca. 1952	1	Railroad Overpass
PIK-200-9	Undocumented barricade	IV	ca. 1980–1990	3	Earthen Barricade
PIK-201-9	Undocumented bridge over tributary to Little Beaver Creek	IV	ca. 1880–1920, ca. 1954	1	Bridge
PIK-202-12	Undocumented bridge over Little Beaver Creek	IV	ca. 1880–1920, ca. 1954	1	Bridge
PIK-203-12	Northwest Portal – Vehicular and Northwest Portal – Pedestrian	III	1985	4	Booth
PIK-204-12	Undocumented temporary warehouse beside X-3346	I	ca. 1996–1997	3	Weatherport

Source: Dobson-Brown et al. 1996 and Coleman et al. 1997.
GCEP = Gas Centrifuge Enrichment Plant.
SNM = Special Nuclear Material.
UEA = Uranium Enrichment Administration.